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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Nitrogen-Fixation Critics

THE Labour members who questioned the Government on Tuesday in the House of Commons on the subject of nitrogen-fixation showed little knowledge and still less understanding of the subject. If their object was to discredit private enterprise in favour of State management of one of the most complex and highly scientific industries in the world they could hardly have chosen a worse example. For in this country, as in the United States and elsewhere, the history of the problem illustrates the futility of Government effort in contrast with the success of private and highly organised scientific enterprise. And Brunner, Mond and Co., instead of being subjected to criticism and unpleasant suggestion based on an atomic knowledge of the case, are entitled to the gratitude of the country for one of the greatest achievements standing to the credit of British chemical and engineering science, and for opening to the nation the unlimited resources of the air for the supply of nitrogenous fertilisers and, in case of emergency, the production of high explosive.

The facts stated were simple enough, but the implications from them almost fantastically discordant. It is true that the Government sent a commission to investi-

gate the methods of nitrogen-fixation in Germany, and obtained a report. It is also true that the Government had appointed a Nitrogen Products Committee, which produced a voluminous report (now out of print) and with which some of our highest chemical experts on the subject were associated. When our supplies of Chilean nitrate needed for high explosive were seriously threatened by submarine attack, and Germany was carrying on because, although natural nitrate was cut off, she was obtaining nitrogen supplies from the air, the Government realised the gravity of our case and started to establish nitrogen-fixation works at Billingham-on-Tees. When the war ended not a ton had ever been produced; indeed, if rumour can be trusted, the so-called works consisted of a site roughly laid out, some buildings and material, and a certain amount of scientific information which the experts had collected. We have heard a remark that does not lend itself to quotation attributed to M. Georges Claude when he visited the works, which but too plainly indicates how barren the outlook then was.

If the Government had failed to do anything definite during the war with all the resources of our chemists available under compulsory service, what hope was there of doing anything when the experts were being demobilised? The Government did the only sane thing possible, and that was to dispose of the project to the one firm before all others likely to make a success of it. With the site and what stood on it went, of course, the information the Government had collected. Its precise value to the Government, or to Brunner, Mond and Co., the purchasers, we cannot estimate, but we imagine it was not too high. In any case it was largely theoretical, and what was wanted was not the chemical theory of nitrogen-fixation but the design and construction of a plant that would successfully produce on a large commercial scale. That many of the experts for whom the Government had now no use should gladly associate themselves with the new venture was only natural.

Nobody except those engaged in the work can say how much effort, research, judgment, scientific knowledge, and constructional engineering skill was required to convert the Government's failure into a commercial success. But it has been done in an astonishingly short time, considering the magnitude of the task, and constitutes one of the greatest of British achievements. When the war ended nitrogen-fixation was still in the experimental stage in this country; to-day Brunner, Mond and Co. are producing by the synthetic process, largely developed by their own staff, about 120 tons of sulphate of ammonia daily, and the plant is capable on emergency of an output of 300 tons a day. While the United States, France, and other nations have been

pottering about with experiments, Brunner, Mond and Co. have delivered the goods, and made Great Britain the greatest producing nation in the world except Germany. The ill-informed people who can carp at a policy which has led to such splendid results seem past praying for. They discredit themselves and the party they affect to speak for.

Ammonia Recovery with Phosphoric Acid

AN interesting development in connection with the recovery of ammonia from gases is revealed by the publication of a patent specification in the names of Professor W. A. Bone and Mr. G. I. Finch. In lieu of the customary method of employing sulphuric acid in a saturator the inventors propose to utilise phosphoric acid, which, it is found, will absorb ammonia with a rapidity approximately equal to that with which it is absorbed by sulphuric acid of equal strength. In this case the compound formed, instead of sulphate of ammonia, is mainly di-ammonium-hydrogen-phosphate, which under suitable conditions of concentration and temperature crystallises out from the liquor. The primary object of the process is not, however, the production of an ammonium phosphate compound *per se*, but to obtain as an end product pure ammonia, and at the same time to operate on cyclical lines so that the phosphoric acid, after effecting absorption, is recovered again for further use in the saturator. This is made possible by the fact that when di-ammonium-hydrogen-phosphate is heated, either under atmospheric or reduced pressure, to a temperature which need not exceed 170°C ., it yields up its ammonia until mono-ammonium-dihydrogen-phosphate or phosphoric acid (or a mixture of the two) is left, the product obtained depending upon conditions of temperature, pressure and length of treatment. In any case, however, the residue when re-dissolved in water is again capable of absorbing ammonia. Thus the necessary acidity of the saturator may be maintained by the acid which is derived from the crystals which have been removed, and by an operation which recovers the ammonia—namely, by heating the crystals.

A point worth noting about the plant employed for absorption is that, although it may be identical with that ordinarily used in the manufacture of sulphate of ammonia, there is no necessity for it to be lead-lined, an important factor from the standpoint of cost. After heating, the ammonia is, of course, evolved in a gaseous condition, when it can either be cooled and compressed into cylinders as pure ammonia or be absorbed in water for the production of concentrated aqueous ammonia. The inventors state that it is not advisable to cool the gases below their dew point before passing them through the phosphoric acid bath, so that in cases where direct ammonia recovery plant (in which the mixture of gases is usually of higher temperature than in the ordinary distillation process) is in use a final bath of dilute sulphuric acid may be added to act as a catch vessel. As the process is one for the production of ammonia only, its application is limited by the fact that 90 per cent. of the ammonia produced in this country is disposed of in the form of compounds, the chief of which is, of course, the sulphate salt.

Bricks from Ashes

IN a lecture delivered last week at the Huddersfield Technical College, Mr. W. H. Casmev drew attention to the fact that in this country we produce over 12 million tons of furnace clinker and ashes yearly, and that by roughly grinding these waste materials and intermixing them with a definite proportion of lime and water a material was formed from which high quality bricks could be produced. The process of manufacture is to pile the moulded bricks on to small lorries and run them into a steel chamber some 60 ft. long by 6 ft. 6 in. in diameter. When the chamber is fully charged it is hermetically closed and steam at a pressure of 120 lb. per sq. in. is admitted, the bricks being kept under this pressure for about six hours, after which, when cooled, they are ready for immediate use. Mr. Casmev estimates that in this way approximately 5,000 million bricks could be made per annum in this country.

Apart from the process mentioned, which we do not remember having come across before, the whole matter of ash disposal is of considerable importance on all industrial works, and in the case of large establishments the cost incurred in removing and dumping these waste materials reaches a startling figure. With the growing tendency to regard nothing as waste it certainly should be possible to devise some means whereby the inert constituents of the fuel we use could be made to take their place on the credit instead of the debit side of the balance sheet, and it is to be hoped that the process outlined by Mr. Casmev may be sufficiently simple and economical as to warrant fairly wide application. Even now we know of quite a number of public utility undertakings which use block-casting machines and turn their clinker and ashes to serviceable use, and in some instances buildings of quite noble appearance have been built from them. The question of durability is, of course, of importance, and experience has not been sufficiently long for a final opinion to be formed. It would seem, though, that no fears need be entertained in this respect.

The German-Russian Agreement

THE report, quoted from the *Berliner Tageblatt*, of an agreement between German and Russian dyestuff interests is one that cannot well be ignored, although the terms are not yet quite explicit. The arrangement for the delivery of German dyestuffs for the use of the Russian textile industry is a comparatively simple affair, though not very pleasant news for those who are looking to Russia for the absorption of some of our surplus production. There are other reported features, however, that recall some of the terms of the proposed Anglo-German agreement, the late Government vetoed. It is said that eight chemists have been sent from German works to Russian factories, for the purpose obviously of instructing the staffs in methods of production as well as of bringing their chemical knowledge up-to-date. In addition a number of Russian chemists are to be allowed to visit German aniline dye factories for the improvement of their technical knowledge, and chemists working in the Russian textile industry are to visit Germany for a similar purpose. Without any inclination to become

alarmist, the prospect of an intimate scientific and commercial alliance between Germany and Russia will set people thinking, and may raise some question as to the wisdom of our own policy of inaction while other nations are establishing trade links. The present conditions, it may be, do not admit of definite treaties, but when these become possible the way will be easier for nations with established, though loose, connections than for those without.

The Institute and the Government

THERE is a notable stiffness in the attitude that the Institute of Chemistry is taking up towards the Government in the matter of voluntary scientific assistance, and the case gains in weight from the terms in which Professor Henderson (re-elected to the presidency) states it. Put briefly, professional chemists have come to feel that they are being exploited by the Government when they are asked to sit on scientific commissions and committees merely in an honorary capacity and to give without remuneration their time and the benefits of their costly education and study to the nation. The Institute, of course, desires to see chemists represented in Government activities in an ever increasing degree, and only objects to the voluntary or patriotic basis on which this participation largely rests at present. It prefers the simpler plan of appointing qualified scientists in charge of Government scientific departments, and points out that there is no lack of such men to meet all the needs of the Government. There is nothing unpatriotic, we think, in such action. It is simply the principle, adopted equally by professional chartered corporations and by ordinary trade unions, of combining together to secure a fair wage for services rendered and refusing to be taken advantage of. By all except, perhaps, a very exalted few, the action of the Institute, we think, will be endorsed throughout the profession.

Jubilee of the A.C.S.

WE are reminded that next year the American Chemical Society will celebrate the fiftieth anniversary of its foundation by a small group of chemists who met to commemorate the discovery of oxygen by Priestley. This meeting was held in Pennsylvania, and of the original charter members, as they are called, eight still survive—F. M. Baumgarten, C. F. Chandler, C. A. Doremus, J. B. F. Herreshof, O. H. Krause, C. E. Munroe, W. H. Nichols, and H. E. Niese. The official journal of the Society wisely points out the great historical interest of the jubilee and urges that preparations should be made in good time for securing its worthy celebration. "Our British friends," it states, "in connection with the Wembley Exposition, issued an engaging book entitled *Chemistry in the Twentieth Century*. This idea might be borrowed for a carefully organised symposium on *Fifty Years in American Chemistry*, composed of original technical papers, reviews, and statistics specially prepared for this occasion, and augmented by concise biographies of the men who have contributed most to this history." This suggests that the imagination required for the right treatment of such an occasion will not be lacking if the live wires at Washington have their way.

Points from Our News Pages

- Mr. R. A. Bellwood's recent lecture on "The Hydrogenation of Vegetable and Marine Oils by a Continuous Process" is fully reported (p. 222).
 "Chemical Poisons in Industry" is the title of a paper of practical interest to all concerned with industrial processes (p. 224).
 Letters are published on "Economic Possibilities of Oil Shales and Lignites" (A. Worsley); "British Production of Synthetic Resins" (R. Attwater); "The N.T.U. Shale Oil Process" (I. S. Winby).
 The presentation to Mr. R. B. Pilcher is noted (p. 226).
 Mr. E. Holmes's fourth lecture on "Chemistry in Relation to Agriculture" is given (p. 226).
 Our London chemical market report shows little of interest during the past week; export inquiry is still restricted (p. 234).
 Our Scottish market report records a quiet week with prices generally steady, notable exceptions being arsenic, formaldehyde, and acetone, which are lower (p. 237).

Books Received

- THE THEORY OF QUANTITATIVE ANALYSIS AND ITS PRACTICAL APPLICATION. By Henry Bassett. London: George Routledge and Sons, Ltd. Pp. 308. 15s.
 OUTLINES OF QUALITATIVE CHEMICAL ANALYSIS. By Frank Austin Gooch and Philip Embury Browning. London: Chapman and Hall, Ltd. New York: John Wiley and Sons, Inc. Pp. 184. 7s. 6d.
 PERIODIC CLASSIFICATION AND ATOMIC STRUCTURES OF THE ELEMENTS. From *Chemistry and Atomic Structure*, by Dr. J. D. Main Smith. London: Ernest Benn, Ltd. 6d.
 A STUDENT'S MANUAL OF ORGANIC CHEMICAL ANALYSIS. By J. F. Thorpe and M. A. Whiteley. London: Longmans, Green and Co. Pp. 250. 9s.
 THE STORY OF THE ATOM. By W. F. F. Shearcroft. London: Ernest Benn, Ltd. Pp. 80. Cloth edition, 3s. 6d. Paper edition, 2s. 6d.
 THE FOUNDATIONS OF COLLOID CHEMISTRY.—A selection of early papers bearing on the subject. Edited on behalf of the Colloids Committee of the British Association by Emil Hatschek. London: Ernest Benn, Ltd. Pp. 174. 18s.
 PATTERNS OF DIRECT COLOURS AND SULPHUR COLOURS ON LOOSE COTTON. British Dyestuffs Corporation, Ltd.

The Calendar

1925 Mar. 7, 14 & 21	Royal Institution: Three Lectures. "The Counting of the Atoms." Sir Ernest Rutherford. 3 p.m.	21, Albemarle Street, London.
9	Society of Chemical Industry and Institute of Chemistry (London Sections): "Chemistry and Civilisation." Sir Max Muspratt. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.
9	Institute of Metals (Scottish Section): "Electric Furnaces." A. Glynn Lobley. 7.30 p.m.	39, Elmbank Crescent, Glasgow.
10	Northern Polytechnic Chemical Association: Open Discussion. 8 p.m.	Holloway.
10	Institution of Petroleum Technologists: Annual General Meeting	John Street, Adelphi, London, W.C.2
11	Institute of Metals: Annual Dinner. 7 p.m.	Trocadero Restaurant, Piccadilly Circus, London.
11	Institution of Chemical Engineers: "Expansion and Compression Phenomena in Steam Jets." Professor A. L. Mellanby.	Institution of Mechanical Engineers, Storey's Gate, London.
11 & 12	Institute of Metals: Annual General Meeting. 10 a.m. each day.	Institution of Mechanical Engineers, Storey's Gate, London.
12	Institute of Chemistry (Manchester and District Section): Social Evening.	Manchester.
12	Oil and Colour Chemists' Association: "Chrome Pigments, some Applications and Properties." W. J. Palmer.	8, St. Martin's Place, Trafalgar Square, London.
13	West Cumberland Society of Chemists and Engineers: Annual Meeting. 7 p.m.	Workington.

The Hydrogenation of Vegetable and Marine Oils by a Continuous Process

By R. A. Bellwood, M.I.Mech.E., M.I.Chem.E.

The following article, based on a recent lecture before the Hull Chemical and Engineering Society, describes a continuous process for the hydrogenation of vegetable and marine oils and summarises the advantages of the system.

BROADLY speaking, the oils and fats found in nature may be divided into two classes: (1) soft oils, (2) hard oils. We are abundantly supplied with quantities of the first kind, but as industry has developed we find that there is a constantly increasing demand for the latter; consequently the demand for the hard oils has exceeded the supply.

For many years chemists have been endeavouring to make good this deficiency. Their examinations of the various types of oil showed that they could be divided into two classes according to their composition. These two classes have as the generic formula of their acids $C_nH_{2n-1}COOH$ =oleic acid type, and $C_nH_{2n}+1COOH$ =stearic acid type. Of the first class, oleic acid, the chief base of all soft oils, is the best known. Substituting the value of 17 for n they obtained the formula $C_{17}H_{33}.COOH$ for the first case, and $C_{17}H_{35}.COOH$ for the second case, thus showing that there was only a difference of two atoms of hydrogen in the molecule, yet in the one case they had oleic acid with a melting point of $4/14^\circ C$. and stearic acid with a melting point of $71.6^\circ C$. It, therefore, appeared at first view that it would be an extremely simple matter to convert oleic acid into stearic acid by the addition of two atoms of hydrogen.

The next point to decide was a method whereby these acids, and also their triglycerides—i.e., the natural oils—could be converted one into the other. As the chemists know it was relatively a simple matter to get iodine and the other halogens to take the place of the two missing hydrogen atoms in the oleic radicle, and a method was proposed in which the halogen additive product was to be made and the hydrogen introduced by substitution.

We learn from the textbooks that it was not until the year 1897 that any systematic study of the catalytic properties of metals was made. Sabatier and Senderens in 1900 published the results of their researches in this direction. They showed that they had experimented with the vapours of unsaturated bodies and had found that absorption of hydrogen occurred when the vapour of fatty acids together with the hydrogen was brought into contact with a suitable metallic "carrier," or catalyst as it is now termed. They found after many experiments that nickel most nearly approached the ideal "carrier." The treating of the vapours of fatty substances was found to be of no practical value because the glycerides became decomposed when submitted to the high temperatures required for vaporisation.

It was not until 1902 that any proposal was made to hydrogenate the oil in its liquid form, this being made by Leprieux and Siveke (German Patent No. 141,029). In 1903 a patent was issued in England to Normann (No. 1,515), which placed the business of hydrogenation on a commercial footing. Great progress has been made since this time and enormous quantities of soft oils are converted into solid fats which are used for a great variety of purposes. Coconut and palm oils, although not liquid at the ordinary temperatures in this country, are hydrogenated so as to give them a higher melting point, and thereby increase their uses and, incidentally, their value.

Uses of Hardened Oil

Whale oil is used in very large quantities in the manufacture of soap and candles, and in the edible trades, and in smaller quantities for medical purposes. Cottonseed oil is used in the manufacture of soap, compound lard, and margarine. Coconut and palm kernel oils are used to harden up margarines and compound lard, but their chief use is in the confectionery trade to replace cocoa butter. Soya and linseed oils are used chiefly for soap making. Palm oil is chiefly hardened for edible purposes of all kinds, as peculiarly the hardening of palm oil prevents the reversion of the flavour after deodorising. Many hardened fats are used for lubricating purposes, insulating compositions, substitutes for tallow, etc.

The actual effect of the hardening process on the oils is to raise their melting and solidifying points, and to lower their

iodine values, and the most important commercial test for hardness is the iodine value. There are three essentials to hardening, which are: (1) a suitable oil, (2) a supply of practically pure hydrogen, (3) suitably prepared nickel to act as a catalyst.

As regards (1), it is necessary that the oil should be suitably refined before hardening. In reference to (2) it may be stated that there are four chief methods of preparing hydrogen: (1) By the action of a metal on an acid; (2) by the action of steam on a metal; (3) by the action of water on carbon; (4) by the decomposition of water.

The first method is now seldom employed on account of its great cost and lack of purity. The second process is extensively used, and since methods have been found to prevent the formation of carbides during the reduction period this process gives a gas that is nearly, but not quite, as good as that obtained by the best methods. The third process was tried about 1911, but did not prove a success for this work. The method has, however, been recently revived, and if the claims made for it can be maintained, it should find a place among the methods now in use.

There is no doubt, however, that the fourth method is at the moment the most favoured because it gives constant and good results.

The decomposition of the water by this method is effected by an electric current which splits the water into its two component gases, hydrogen and oxygen, and it is claimed that the gases are produced purer and at a lower cost than by any other method.

Such a plant has been recently erected, and set to work in Italy. This plant has a maximum output of 18,638 cubic feet of hydrogen, and 9,319 cubic feet of oxygen per hour. The hydrogen direct from the cells was guaranteed to be 99.5 per cent. purity, and the oxygen 99.0 per cent., while the actual figures obtained were hydrogen 99.99 to 100 per cent. and oxygen 99.6 to 99.8 per cent. purity.

Suitably Prepared Nickel

From time to time various freak methods of manufacturing catalysts have been brought forward, but the only ones that have survived in practice are:

(1) The use of a carrier, such as Kieselguhr, with a precipitate of nickel on its surface—the so-called powder catalyst.

(2) Gaseous catalysts such as nickel carbonyl, which are decomposed within the body of the oil, giving atomic nickel.

(3) Solid nickel in the form of fine turnings from the bar, strips, wire, etc., the surface of which has been suitably activated.

The second method has the inherent defect that its use gives rise to the formation of carbon monoxide within the oil, and even if the actual poisoning effect of this is small, its mass effect on the hydrogen causes a loss of gas through blowing away the one to get rid of the other.

The first method until recently was the one in general use, but it is very costly and slow, and the capital outlay on plant, buildings, and land is very great. The plant necessary consists of two solution tanks, one precipitation tank, one filter press and pump, one drying oven, one gear-driven reducing vessel, one oil catalyst reservoir, one grinder for reducing to powder.

Preparation of Catalyst

The requisite amount of nickel sulphate or nitrate is dissolved in a container with water slightly warm, care being taken that the solution is complete. At the same time sufficient soda ash to ensure complete precipitation of the nickel salt is dissolved in a vat. During the time that these solutions are being made a charge of Kieselguhr is placed in the precipitation tank, together with sufficient water to make it into a thin paste, and the two are agitated for about one hour. At the end of this time the solution of nickel salt is run in, and again

the Kieselguhr is agitated for a further hour. This ensures the nickel solution being thoroughly mixed with the Kieselguhr.

At the end of this time the carbonate solution is run in, causing the precipitation of the nickel carbonate within the impregnated Kieselguhr. Agitation is continued for a further hour so as to ensure complete precipitation, and then the contents of the precipitation tank are pumped into the filter press, the alkaline tank water running to waste, and the press cake consisting of nickel carbonate impregnated in Kieselguhr is retained. It is essential that on no account must any alkali be present in this cake, so it is washed with alkali free water until the wash waters are absolutely free. This is a very difficult matter, and the press must be emptied at least twice after the wash waters come away neutral in each case, the cake being returned to the precipitation tank, lixiviated with alkali free water and pumped back into the press again for a further washing. In other words, the precipitated matter is filter-pressed not less than three times, more if necessary, the final test being when a sample of water drawn from the precipitating tank while washing is found to be free from alkali.

The press is then opened and the wet cake is removed in shallow trays to a drying stove where it has the bulk of its moisture removed by means of hot air. When no more moisture comes away the cake is removed to the reducer and the furnace lit.

The moisture remaining in the cake will be sufficient to generate enough steam to sweep the reducer free from air, and just before this steam stops coming off hydrogen is turned on, and the reducer brought up to a temperature of about 330° C. The reduction of the nickel is gauged by the amount of water collecting in the water trap and reduction is complete in from four to eight hours, depending on the rate of heating and the condition of the press cake. When reduction is complete the furnace is stopped and the reducer cooled, hydrogen being kept on until the temperature is under 60° C. The hydrogen is then turned off and carbon-dioxide turned on to sweep out the hydrogen. The reducer, which has been revolving all this time, is then stopped and the catalyst withdrawn into a tank containing the oil which is being used, this tank being situated under the outlet of the reducer. The catalyst is well stirred into this oil and is then ground in a revolving grinder until it attains the smoothness and consistency of paint: it is then ready for use. It will be seen from this description that as previously stated the process is slow and costly.

Comparison of "Powder" and "Metallic" Catalyst

It will be seen that the "powder" catalyst consists of Kieselguhr impregnated with metallic nickel, and in determining the catalyst concentration the nickel only is stated. For instance, if we speak of .1 per cent. concentration of catalyst and the proportion of Kieselguhr to nickel 4 to 1, then we need .5 per cent. of the mixture for 1 per cent. nickel.

It must be also noted that this catalyst cannot be regenerated, and when used it must be treated first to remove the oil and then to dissolve out the nickel.

It has been found in practice that it sometimes pays to use a stronger concentration than .1 per cent., and to use the catalyst over again, but even when this is done it is seldom that the average nickel consumption can be kept below this figure. This means 2.24 lb. of nickel per ton of oil treated.

It is doubtful whether the catalyst made by the above method can be produced at less than 5s. per lb. of nickel, ignoring all overhead charges and including only the cost of material, labour and power. Taking the loss at 2.24 lb. nickel per ton this is equal to 11s. 2d. per ton of oil treated, assuming that the residual nickel in the catalyst has no value.

On exactly the same basis giving and ignoring the same values, we find that in the anodic method of catalytic use the cost per ton of oil treated is 2s. 4d. only, this being from this view alone a saving of 8s. 10d. per ton of oil treated in favour of the anodic method. The loss of oil in the catalyst in the powder form depends on the efficiency of the filter press, but from tests of spent catalyst over a period, the oil content is seldom found to be less than 70 per cent. of the catalyst used, or, in other words, the press cake contains 41 per cent. oil. With a nickel concentration of 2.24 lb. of nickel per ton of oil we should need 11.2 lb. of catalyst per ton of oil; 70 per cent. of this is 7.8 lb., therefore this weight of

oil, subject to adequate recovery methods being invented, is lost per ton of oil treated. This oil at £40 per ton is worth 2s. 9d.

The loss of oil on the metallic type of catalyst is nil, thus there is a further saving of 2s. 9d. on this method.

Poisoning of Catalysts

Catalysts lose their activity through what is known as "poisoning," and it is found that when using powder catalysts the poisoning cannot be localised. In other words, the reaction due to a charge of catalyst is retarded as a whole until the poison is "absorbed." As soon as it is found that the hydrogen absorption becomes constant (showing that the "poisons" have all been absorbed by the catalyst), a fresh charge of catalyst would start the reaction at normal velocity.

In the new continuous process with a metallic catalyst a series of cages are arranged, in which the "using up" process is admirably demonstrated. It is always the cage which first receives the oil that first loses its efficiency, and even when this cage can take no further part in the hardening, it has its value as a poison remover, thus allowing the oil in a non-poisonous state to act with the catalyst in the remaining cages, and the fact that the catalyst as a whole is not poisoned constitutes a marked improvement over the old method. A further advantage is that the poisoned catalyst can be immediately detected and cut out of the series for regeneration.

Manufacture and Regeneration of Anodic Nickel Catalyst

To produce catalyst in the new form by the new process the whole of the cumbersome machinery previously described is swept away, along with the power, labour, and other costs involved.

As previously mentioned, to produce the catalyst required, pure nickel bars are used from which an extremely fine cut turning is produced, the method of activating and re-activating being the subject matter of Patent No. 203,218, 1922. It is estimated that one cage containing 100 lb. of these nickel turnings will have approximately 8,500 sq. ft. of available surface. These turnings receive a simple preliminary treatment which makes them extremely sensitive to anodic oxidation. To make the catalyst active it is placed in its cage within a bath (preferably of porcelain) containing a 5 per cent. solution of sodium carbonate. The cage then becomes the anode of an electrolytic decomposition bath, the cathode being a circular plate of nickel surrounding the cage. The current and voltage-drop across the cell will depend on the resistance of the cage and its filling to the passage of the current, but not more than 15 volts should be required with a current density of from 1 to 5 ampères per lb. of nickel, the ultimate work done by the electric current being the splitting of water into oxygen and hydrogen, the oxygen attacking the nickel with the formation of nickel oxide and the hydrogen being liberated.

There is, however, one other function that the oxygen carries out that has a great bearing on the re-activity of the catalyst. In all re-activation work the great trouble is sulphur. This sulphur may get to the nickel from either the gas or the oil or as is often the case from both. It is a well-established fact that the sulphur compounds are the worst of the catalyst "poisoners," and in any catalyst subject to continuous reactivation provision must be made for preventing any accumulative effects of sulphur poisoning.

In the anodic method any sulphur present in the cages is oxidised to sulphate, and therefore is removable in the wash waters; a very vital point. After the current has been on the cages for eight hours, it is switched off and the cages removed from the soda bath to a further series of porcelain pots, where they are washed in running water until they are free from alkali and any soluble products. The cages are left in the water until they are required.

Reduction

The cages now contain nickel oxide which must be reduced to nickel before the reaction can proceed. To do this the cages are placed within the reaction vessel in which they are to work. Here they are reduced *in situ*, thus avoiding the fear of accidental contact with air, and a consequent loss of activity. The method of reducing is quite simple, viz.:

The oxidised turnings are placed in the reaction vessel, which is then sealed up and a vacuum drawn on of at least 26 in. Hydrogen at 60 lb. pressure to the square inch is

then admitted to the vessels, a small amount of hydrogen being allowed to pass from the vessels to maintain sufficient circulation to sweep out the water of reduction.

The temperature of the cage and its contents is then raised by means of the heating system to about 300° C., and kept at this for eight hours by which time the oxide of nickel will be reduced to active nickel. The temperature of the vessel is then allowed to fall, and the hydrogen pressure allowed to fall to about 5 lb. to sweep out any steam in the vessels which might cause hydrolysis of the oil during hydrogenation. Everything is now ready for the hydrogenation of the oil.

The actual life of the catalyst charge is not yet known. Some cages which were filled 18 months ago show no signs of deterioration as yet.

The Efficiency of Continuous Plant under Varying Loads

With a view to determining the efficiency of the continuous plant when hardening to various iodine values, a series of experiments were conducted using largely varying quantities of oil per hour. It was realised that when the quantity of oil was small, the small mass of oil in contact with the hydrogen would lower the absorption and also, as the oil reached nearer to 0° I.V. the absorption would fall off, and again at the other end when the mass of oil far outweighed the mass of hydrogen a similar falling off would result.

The hydrogen absorptions were: With 4 lb. of oil passing per hour 8,200 cubic inches with a final I.V. of 6; with 8 lb. of oil passing per hour, 11,800 cubic inches with a final I.V. of 29; with 12 lb. of oil passing per hour, 13,200 cubic inches with a final I.V. of 44; with 16 lb. of oil passing per hour, 13,200 cubic inches with a final I.V. of 55; with 20 lb. of oil passing per hour, 11,000 cubic inches with a final I.V. of 66. Allowing for the various mass reactions, it is thus seen that while the efficiency of the plant is greatest when about 50 per cent. of the possible total is absorbed, yet there is but little dropping off within very large ranges.

Advantages of the New Continuous Process

To sum up, the advantages of the continuous process are:—

- (1) The cost of catalyst, labour, and power are considerably reduced per ton of oil treated.
- (2) The cost of land and buildings is reduced, due to the fact that considerably less plant is required.
- (3) The capital expenditure being low, the overhead charges on the oil worked are also less, giving a better competitive margin.
- (4) The process, being continuous, gives greater output for a given sized unit, with greater opportunities of heat economy.
- (5) The catalyst is re-activated practically without loss. The re-activation restores 100 per cent. efficiency.
- (6) Owing to the absence of catalyst supports, such as Kieselguhr, and to the fact that metallic nickel is the only substance used in this process, the free fatty acids do not increase during hydrogenation unless water is admitted to the hydrogenation vessels.
- (7) The catalyst remains in an atmosphere of hydrogen throughout its whole life, whereby its activity is prolonged over that possible with powder catalysts, which are removed from the reducer in air, and ground in air.
- (8) The catalyst retains its activity over a much longer period than when in powder form.
- (9) The labour costs are exceedingly small as two process men only per shift are required to work a plant capable of hardening 50 tons of oil per week; these men look after the hydrogen, hydrogenation, and washing and oxidising plants.
- (10) As pointed out by Lush in the *Journal of the Society of Chemical Industry*, March 14, 1924, in the method employed in the continuous process the "new acids of hydrogenation" can be controlled.
- (11) The oil leaves the plant with an average nickel content of 1 part in 10 million only, which is considerably less than the arsenic allowed by law in food products.

Artificial Silk

The *Manchester Guardian Commercial* has published an informative supplement on "Artificial Silk"—a "world survey of the new textile industry." Every phase of manufacture is dealt with and numerous articles on the technical processes are contributed by authoritative writers. The subject is so thoroughly covered that the supplement may be regarded as a work of reference of this new industry.

Chemical Poisons in Industry

Paper by Dr. Renshaw

At a meeting of the Manchester Section of the Institute of Chemistry, on Monday, Dr. Arnold Renshaw read a paper upon "Chemical Poisoning Occurring Amongst Industrial Workers." He said that in industrial poisoning the age of the person affected was a factor—the younger the person the more susceptible. His opinion was that men were more susceptible than women to long-continued chronic poisoning; women were probably more susceptible than men to acute poisoning by large doses.

Chlorine Poisoning

In industry chlorine poisoning was usually limited to chemical works and bleach works. In acute cases there was intense irritation of the mucous membrane of the respiratory tract, producing catarrh of the upper air passages and inflammation of the lungs. This respiratory effect constituted the menace to life; the theory that chlorine acted on the outer membrane of the brain, producing a narcotic effect, he considered very doubtful. Lehmann had stated that one part of chlorine or bromine per 100,000 was injurious and that one part per 10,000 could produce actual ulceration of the respiratory mucous membrane. These figures agreed fairly well with other figures obtained in regard to phosgene.

The chronic type of poisoning occurred in factories where chlorine was produced electrolytically. Ulceration of the skin and dermatitis might occur; also gastric catarrh, dyspepsia, anæmia, and loss of weight. It was probable that continued exposure to bromine or iodine fumes would have similar effects, in lesser degree and with greater dosage.

Phosgene

Phosgene was produced by direct combination of carbonic oxide and chlorine in the presence of animal charcoal. It was an extremely poisonous gas. Four fatal cases of phosgene poisoning were reported before the war, and it was one of the gases used at the end of 1915 on the western front. Whilst in France he had facilities for examining the effects of it, and in view of the importance of phosgene in the chemical industry he thought it desirable to describe the investigations made by him in his own laboratory in conjunction with Captain G. C. Douglas. From these it appeared probable that phosgene, as such, exerted no toxic action on the body, but that its effect was due to the liberation in the lungs of nascent HCl. This, acting locally, produced oedema, and by subsequent absorption neutralised the plasma bicarbonate, so removing the natural vehicle for elimination of CO₂ in the tissues. Undue exertion, giving rise to the production of much CO₂ in the tissues, would then be liable to produce serious effects, since there would be diminished means of carrying CO₂ in the blood and a damaged mechanism for getting rid of it through the lungs.

Carbon Bisulphide

Carbon bisulphide was used in the extraction of fat and oil from bones and seeds; it was also a solvent for rubber and was used in vulcanising. Of recent years it had been used extensively in the artificial silk industry. Acute poisoning was rare and resulted from swallowing the liquid. A patient who swallowed 2 oz. recovered, but in another case a fatal result followed the swallowing of half an ounce. Probably death was due to paralysis of the respiratory centres.

About 1 mgm carbon bisulphide per litre of air sufficed to induce chronic effects, and this amount might easily be exceeded in vulcanising rooms unless special precautions were adopted. In artificial silk factories, even with the most up-to-date ventilation, it was probable that this limit was very closely approached. There was rarely a fatal issue, slight cases usually ending in recovery after more or less prolonged convalescence, while in severe cases serious mental disturbance might persist. In Germany there was full recognition of the dangers of carbon bisulphide poisoning, the industrial loss which might be thereby occasioned, and the permanent incapacity which might accrue. Regulations dated March 1, 1902, made very careful provision concerning ventilation, warmth, volume of air per person (700 cub. ft.), handling of the carbon bisulphide, washing accommodation, etc.

Aniline Poisoning

Dealing with the nitro and amido compounds of the aliphatic and aromatic series, the author stated that the loss of

working days through aniline poisoning was fairly considerable. In one factory 33 cases occurred out of 251 employees, causing a loss of 500 days through sickness. He described four cases of poisoning with mono-nitro-chlorbenzene which occurred in a chemical works, the men affected being those who attended to trays into which the oil was run and allowed to cool. Vapour was probably given off from the trays and affected the lungs. It was possible that on absorption into the blood the mono-nitro-chlorbenzene was slowly converted into amido-chlorbenzene by the reducing action of the haemoglobin. The action was cumulative, and when a sufficient quantity had been absorbed toxic effects might occur.

Other poisons were referred to by the author. In concluding, he said there was no doubt that the greatest care should be taken in industry to prevent the occurrence of such cases of poisoning, and he believed employers were anxious to do their utmost. When dealing with unskilled labour, difficulties arose from ignorance and consequent carelessness in handling poisonous materials. Elementary precautions were the provision of special clothes and overalls, and also baths, but these were of no avail unless the workers used them.

The N-T-U Shale Oil Process

To the Editor of THE CHEMICAL AGE.

SIR,—I write to express my appreciation of the article which appeared in the current issue of THE CHEMICAL AGE (February 25) on "Production of Shale Oil by the N-T-U Process." In reading this to-day I note what is a printer's error in regard to one of the totals of the labour charges of handling shale, otherwise the article is very good.

On page 197, second column, the printer's error occurs in the figures given as the total labour cost of the mining, crushing, transportation, etc., of the shale, as estimated by Smith Emery and Co. This should have read \$9335 per ton, and not \$9.335.

As the low cost we have arrived at is the most convincing and interesting feature of the article, I should be extremely obliged if you could insert in your next issue a correction of the error.—Yours, etc., I. S. WINBY, Director.

40, Grosvenor Place, S.W.1.

March 2.

British Production of Synthetic Resins

To the Editor of THE CHEMICAL AGE.

SIR,—I have read with interest the paper in your issue of February 21 on "The Solubility of Synthetic Resins." There is one *very much mistaken* statement that is very harmful to British manufacturers. The annual production is given as:—America 500, Germany 300, France 100, Great Britain tens of tons. At present we produce 50 tons per annum. There are five other substantial makers in Britain who will produce each an average equal amount. So that the British production will approximate 300 tons per annum and very shortly we shall double our production. We are shipping to the Continent, the Colonies, and the Far East. Moreover, our own production is certainly equal to any produced in Germany or America, and the largest producing firm in Germany is manufacturing their material under a German patent which they bought from our chemist. I hope you will give our statement the same publicity that you have given to that of Mr. Drummond.—Yours, etc., RICHARD ATTWATER.

Attwater and Sons, Preston.

February 27.

Economic Possibilities of Oil-shales and Lignites

To the Editor of THE CHEMICAL AGE.

SIR,—So many disappointments have resulted from ill-considered attempts at operating shales and lignites for the extraction of their products that special care should be taken not to add to the number. Professor Boswell* and others say that such warnings are needless, but Mr. G. W. Wallace* tells us that "the time has arrived for the commencement of the shale oil industry in a substantial commercial manner, both in the United States and many foreign countries."

I would suggest that although the researches of the last five years have removed many technical difficulties which had formed a complete barrier to the exploitation of most shales, there yet remain economic difficulties which must keep out of operation fully 95 per cent. of the known shale areas of the world. It is to these latter that attention should be drawn, on account of their unsuitability for competition with well-oil products. If we admit that some high-grade oil-shales, specially well placed as regards local markets, may be operated at a profit, let us consider the position of medium-grade deposits not so well situated.

(1) Shales averaging 20-28 gallons productivity cannot be classed as "self-combustible," and cannot be treated in retorts which are suited only to "self-combustible" shales of substantially higher grades.

(2) The cost of storage given by Mr. Wallace is remarkably low, and it would appear that, in the case cited by him, the products are mainly sold and removed without any need for storage. If so, he is treating of an almost unique proposition.

(3) It also seems that he calculates the value of the products as though he obtained "cash ex works" for them. This may be possible in his case, but must be a very rare incident in commercial transactions generally, unless freights are deducted from market prices when assessing values, or there is only one buyer.

(4) The lower the grade of the shale, the bigger the plant must be to promise profitable operation. But, in such case, the local markets may quickly become over-stocked, especially with low-grade oils. But cheap oils will not stand the cost of freight to distant markets, nor the cost of containers. In such case they become valueless, and the profits on the higher-grade products are insufficient to make the entire enterprise payable.

Apart, therefore, from any technical questions, it appears that an oil-shale project should satisfy the following requirements:—(1) The average productivity should not be much under 40 gallons; (2) the whole of the low-grade oils should be saleable or usable locally as produced, and without long storage; (3) the shale must be of an unobjectionable nature (as regards sulphur), amenable to treatment, productive of a high ratio of the more valuable products, and consistent throughout in its character.

From a consideration of our English shales it will be seen that these three desiderata may rule out the whole of the shales in great areas of country. But it is true that if spent shale can be utilised, or, in the case of lignite, the coke can all be utilised, or a part of the lignite briquetted, and fortified by the products of the treated portion, then there is a wide opening for the development of successful industry, and especially so in a protected market.—Yours, etc., A. WORSLEY.

Isleworth, February 28.

Stainless Steel Assessment Appeal

AN income tax appeal—Collins (Inspector of Taxes) v. The Firth-Breareley Stainless Steel Syndicate, Ltd.—came before Mr. Justice Rowlatt on Monday.

The respondent company appealed against certain income tax assessments. The question was whether any profits which might be found to have resulted from the sale of patents were chargeable to tax as profits of the respondent company's trade.

It was contended for the company that the letters patent and the proceeds of sale were capital assets of the company; that the sale of the patents by the company was a sale of capital assets which had been replaced by other capital assets; that the sums received were the purchase prices of the capital assets sold and were not assessable to income tax as trading receipts or otherwise; that the sales did not amount to a trade carried on by the company; that, in any event, the company was only liable to tax upon such part of the sums as were found to be profit, which could not be ascertained until the agreements had been worked out.

For the Crown it was stated that the company carried on the trade of acquiring, disposing of, and otherwise turning to account inventions, patents, and the like; that the sums so received were profits arising to the company from that trade, and were not capital assets; and that the profits should be included in the assessments under appeal.

The appeal was allowed, with costs.

* THE CHEMICAL AGE of 23/2/25, pp. 203 and 199.

Chemistry's Relation to Agriculture

Nitrogenous and Other Manures

In the fourth of his lectures on "Chemistry in its Relation to Agriculture," given in the Chemistry Department of the University of Birmingham, on February 25, Mr. E. Holmes dealt with manures in general and nitrogenous manures in particular. He pointed out that probably the most outstanding contribution of chemistry to agriculture had been the chemical examination of farmyard manure, bones and allied products, the recognition of their valuable constituents as compounds of nitrogen, phosphate and potash, and the subsequent discovery, manufacture and elucidation of the properties of the various mineral fertilisers. Farmyard manure was a complete manure in that it contained all the constituents removed from the soil as plant food; although, owing to losses due to their removal in cattle and crops, these constituents were not always in the best proportions for the succeeding crop. By the present wasteful method of storing farmyard manure the average farmer lost 50 per cent. of the nitrogen originally present. This was partly owing to bacterial activity resulting in the production and loss of gaseous nitrogen, and partly to the washing away of the soluble nitrogenous compounds by rain water. The first might be prevented by consolidation of the heap, since such bacterial activity was inhibited under strictly anaerobic conditions, and the second loss might be stopped by the provision of some form of shelter, a most unusual proceeding in this country.

From time to time considerable quantities of guano, coprolites, bones, shoddy, fish wastes, greaves, and other products had been used as manures. They varied in efficacy and in rate of action to a very considerable extent. Guano had been obtained as a mixed nitrogen-phosphorus fertiliser from rainless districts, and as a phosphatic guano from districts where rain had washed out the more soluble nitrogenous compounds, either present originally or as the result of nitrification of more complex compounds. Soot was valuable partly for its physical property of helping to warm a soil, partly for its ammonia content, and for its beneficial action in removing soil denizens such as slugs and snails.

Nitrates were available for agricultural purposes in four forms: As the sodium salt, from the crude caliche of Chile; as the potassium salt, obtained from the sodium salt by interaction with potassium chloride, and which, although dearer than the corresponding mixture of potassium chloride and sodium nitrate, yet found application in such places as the Canary Islands, where freights were high; as the calcium salt from the Birkeland-Eyde and similar processes; and as the ammonium salt, also from synthetic sources. This latter was one of the most concentrated fertilisers, equalling urea with 35 per cent. nitrogen, but its general use had been hindered by its very deliquescent nature, and by the disastrous results of its incautious use. It must be handled with care corresponding to its high solubility and great concentration. It would, however, probably command a fair price in the future if only for its saving in freights, as in the case of potassium nitrate.

The use of ammonium salts was the direct result of the old erroneous theory that all plants obtained their nitrogen, as ammonia, from the atmosphere. At the present time ammonium sulphate, once the monopoly of the gas industry, was being made at Billingham from synthetic ammonia, and gypsum found in the vicinity, no free sulphuric acid being employed. Very great care was necessary in the drying of neutral sulphate of ammonia in order to preserve the drillable nature of the salt.

Although employed somewhat in France and in the States calcium cyanamide had not come into such general use, in this country, as had been anticipated. This was partly due to its dusty and caustic nature, which made it objectionable to handle, and partly to its conversion, under certain soil conditions, to dicyanodiamide. While not being unfavourable to ammonifying bacteria in the soil, this compound was very toxic to nitrifying bacteria and to plant life. The objection on the score of dustiness was often got over by incorporating 3 to 4 per cent. of a heavy oil with the material, but the other objections were more serious.

The lecturer closed by showing that if the availability for plant life of the nitrogen of sodium nitrate were represented

by 100, that of the nitrogen in ammonium sulphate was represented by 90 to 95, of dried blood about 60, and of farmyard manure 55. These values varied to some extent with the type of land, and with its previous treatment.

Institute of Chemistry

Government's Attitude to Chemists Criticised

At the forty-seventh annual general meeting of the Institute of Chemistry, held at 30, Russell Square, London, on Monday, the President (Professor G. G. Henderson), after referring to the loss sustained by British chemistry by the death of Sir George Beilby, one of the past presidents, announced that the Council had invited the co-operation of the Society of Chemical Industry and the Institute of Metals, of which Sir George had also been president, in establishing some fitting memorial in his honour. Professor Henderson also paid a high tribute to Sir James Dobbie, Government chemist, to Mr. Otto Hehner, who had achieved a world-wide reputation for his investigations in the chemistry of food and drugs, and to Professor G. D. Liveing, who had laid the foundations for the great school of chemistry which had since been developed by Sir William Pope at Cambridge.

Increasing Membership

The roll of membership of the Institute, numbering 4,708 Fellows and Associates, he said, had increased beyond their expectations; its finances were in a sound condition, the reserves had been augmented by a legacy of £1,000 under the will of Mr. Edward Riley, and they were shortly to receive an additional legacy of nearly £5,000 from the estate of Sir Alexander Pedler.

Government's Relation to Chemists

The Institute was frequently invited to appoint delegates to participate in public inquiries. Such invitations were welcomed, but the Council had felt obliged to give expression to a mild protest that provision could not be made to lighten the sacrifice of time and expense which the duties of such representatives entail. The Council was diffident about asking Fellows who were resident in the country to attend Government Committees at their own cost and without emolument. It was supposed that they would make the sacrifice for the honour and recognition thus accorded them; but only men of already acknowledged position were likely to be selected as representatives; however eminent they might be, few could afford to neglect their work and bear the expense which such duties involve. The attitude of authorities towards scientific men had been reflected in the speeches of Ministers of the late Government, who apparently regarded the professional scientific man in the Civil Service as a very useful person in an ancillary or subordinate position; but it should be insisted upon that scientific departments should be controlled by competent scientific men. Chemists who were also capable men of affairs were available; many such held high positions in industry, and they were coming more and more into positions of control. It was the business of the Institute to ensure the supply of such chemists for the benefit of the country.

The President commended the activity of the local sections of the Institute which were doing so much to promote true fellowship in the profession. He referred also to the movement towards closer co-operation between the societies concerned with chemistry, which he felt would soon be marked by important developments.

The Benevolent Fund established as a memorial to members who had fallen in the war was deserving of the most generous support, and he was glad to find that the Committee concerned could rely on funds being forthcoming to meet the urgent appeals with which they had to deal.

The result of the election of officers and council for the ensuing year was announced, and at the conclusion of the formal business, the President, supported by Professor Thomson, made a presentation, on behalf of the Fellows and Associates, to Mr. Richard B. Pilcher on completing thirty years as secretary and twenty-five years as registrar and secretary of the Institute. In the evening the Council entertained Mr. and Mrs. Pilcher and their family to dinner at the Hotel Russell, followed by a reception.

British Association of Chemists

A New Campaign in the London Area

THE annual dinner of the London Section was held on Saturday, February 28, at the Engineers' Club. Dr. E. F. Armstrong, President, was in the chair, and Mr. C. S. Garland the guest of the evening.

Mr. H. E. J. Cory, the Treasurer, in proposing the toast of the London Section, paid a high tribute to the work of the committee. Owing, he said, to the extended area, the London Section was extremely difficult to administer, but the London Committee was now engaged in reorganising the section, which was to be divided into eight divisions, each under the control of a supervisor, whose duties would be to keep in touch with members resident in that area, and to do all in his power to obtain new members. In conclusion, he appealed to all members to co-operate with the committee.

Mr. S. R. Price, Chairman of the Council, replied, referring to and strongly urging the cultivation of a stronger "group" spirit.

Mr. E. R. Redgrove proposed the toast of "The Ladies and Guests," which was acknowledged by Miss Wright.

Mr. C. S. Garland, in proposing the toast of "The President," described him as one of the greatest of scientists and one also of the greatest industrialists to be found among chemists. In becoming their president he had done a courageous thing, because they were not yet exactly a fashionable body, but the good work they were doing was gradually becoming better understood. The district scheme seemed to him a good one and he hoped they would all work for its success. As an example of the influence the B.A.C. had on public affairs he mentioned that the Association was the first body to approach the Board of Trade respecting the Anglo-German dyestuffs agreement, and they might feel gratified with the result of their action.

Dr. Armstrong on the Chemical Function.

The President, in replying, expressed his high appreciation of the honour they had done him in electing him as their president. He felt bound to accept their invitation because, although such action might invite criticism, they all owed a duty to their profession which ought to be discharged. The chemist he defined as a person who was doing what the Americans called "worth while" things in the world; a person who, by his training and ability, was trying to make the world a better place than he found it. Their object was to take things as they are and by the application of scientific methods to improve them, to cheapen the production of necessary products, and to add to their number by invention. The chemist, like the engineer, might claim that the advances in civilisation and industry were due to his efforts, and there might be a modicum of truth in each claim. He favoured co-operation between the two, because, while the engineer was responsible for designing and constructing plant, etc., it was the chemist who guaranteed him the right materials.

Mere tests of examination, he said, did not constitute a chemist. He did not regard as a chemist anyone who, having had a certain training in chemistry, performed certain mechanical operations according to instructions. A chemist was one who brought intelligence and scientific knowledge to such tasks, who possessed the chemical sense and looked at things from the chemical point of view. Where chemistry was taught at all it should be taught thoroughly; there were far too few real chemists and far too many jacks of all sciences. He took, however, a broad definition of a chemist as a man applying his brains and chemical knowledge in his daily work. If they tried to put the chemist in the position of the barrister they could not avoid having a close profession and creating a kind of aristocracy. The Association, on the other hand, stood for equal rights for all. The public had come to regard as a chemist the man in the corner shop with the coloured bottles, and he did not think they would ever oust that popular view. He attached more importance to work than to nomenclature, and though success was largely judged from the pecuniary point of view the true success lay in doing things for the sake of scientific truth and making better conditions in the world. The B.A.C. appealed to him because it aimed at a fair deal for everybody. Everyone could not afford long and costly university courses and win the successes that caught the eye, but all, even the humblest, could aim

at doing "worth while" things and seek after truth for truth's own sake. (Applause.)

The speeches were interspersed with interesting musical items contributed by members.

The De-greasing of Wool

Valuable By-products and their Uses

MR. E. B. FRY, following his recent paper on "Textile By-Products," addressed a meeting of the London Section of the Textile Institute. He had mentioned that at the Arlington Mills, in Massachusetts, U.S.A., they had a solvent process for washing wool. The wool was put into enclosed kiers and wood naphtha was forced through the kiers up through the wool until the whole was de-greased. That grease was extracted from the naphtha which was taken off it and used again. The lecturer thought that the waste of naphtha after washing the material was only about one per cent. It was passed through the wool and into the tanks, and from that it was distilled off, leaving a pure grease as a by-product, which was used for lanoline and for other purposes as an ordinary fat. In that solvent method of treating the wool, no effort, so far as he knew, was made to recover the potash, only the grease. The potash was left in the wool after de-greasing to form a natural soap, but the grease was greatly in excess in some wools, and this excess of grease was dissolved out by the naphtha process, and the wool was simply passed through ordinary water when it formed its own soap with the potash and the grease, and no further soap was necessary for washing. He did not think that there was any attempt made in America to recover the potash. It was in the French and English methods that the potash was recovered. In these cases the potash was extracted first and the wool was treated to successive shower-baths and percolations of warm water. After that the wool was washed by the ordinary emulsion method, by the use of soaps and alkalis, and the grease was then recovered from the waste washing liquor. There had been attempts to extract the potash as well from the washing liquor, but they had not been successful.

The lecturer went on to refer to the cleaning cloths made from the noils combed out in the waste silk trade, and he said that this had become quite a considerable business in the textile industry, where contractors supplied the cloths to the textile engineering firms. The bulk of the cloths got saturated with oil, and the manufacturers of the cloths undertook to supply a certain number of clean cloths each week; they took away the dirty ones, put them under powerful pressure and extracted the oil, cleaned them and sent them back. For the oil so extracted there was, of course, a ready market.

Dyeing Prices and Production Costs

At the 27th annual general meeting of the Bradford Dyers' Association, Ltd., held at Bradford on Friday, February 27, interesting information was given on the subject of costs and prices. It was found that the average dyeing price during 1924 was 12 per cent. lower than that of 1923. This reduction, however, was counteracted by the fluctuations of the raw material. Production costs which a year ago were showing a downward movement, were now checked and in some cases suffering from a reaction. A level lower than the present was hoped for, but fluctuations were anticipated before costs stabilised.

Reference was made to the increasing French competition, not only in the foreign, but in the home markets, and to the fact that home imports from France had increased by 33½ per cent.

Naphtha Export Appeal

An appeal from a decision of Mr. Justice Roche, in the case of *Cantiere Navale Triestina v. Handelsvertretung der Russe*, etc., Naphtha Export, was heard in the Court of Appeal on Monday. It raised some important points as to whether a ship at a certain date was or was not an "arrived" ship within the meaning of a charterparty, and whether in the circumstances the charterers were excused from an absolute obligation to load from that date.

The Master of the Rolls said that Mr. Justice Roche's judgment must be set aside and judgment entered for the plaintiffs for £3,168 15s. and costs.

Radium Research

Commercial Production and Method of Extraction

IN the course of a paper before the Institution of Engineering Inspection on Friday, February 20, on "The Radium Industry: Its Development and Importance," Major CHARLES E. S. PHILLIPS, after referring to the discovery of radium, said that the relationship of radium to uranium had now been definitely made out. After referring to the fact that radium was found principally as pitchblende, carnotite, autonite, torbernite or gummite, and describing each, Major Phillips said that the growing demand and high price obtainable for radium had stimulated a wider search for further sources of uranium and for facilities to carry out the radium extraction process on a larger scale. In France a laboratory and factory had been established at Giff for the purpose of chemically concentrating radium from Portuguese autonite, and for some years the world's supply largely came from this source. During the later stages of its development, Madame Curie certified the radium content and purity of the supplies sent out from this establishment and thus the public were protected against fraud. Considerable quantities of the Giff radium were imported into this country by Siemens Bros.

Reference was then made to the establishment of standards which resulted in the total extinction of frauds upon the public, and the fact that to-day nobody purchased radium in England without a National Physical Laboratory certificate as to quantity.

In 1911 a much more extensive commercial radium enterprise was founded at Pittsburg, U.S.A., where a company was formed to exploit a vast area of carnotite which had been discovered in Colorado, the intention being to extract not only radium but also vanadium. By 1920 the numerous difficulties connected with operations of this character, on a large scale, had been sufficiently overcome and the world's supply of radium soon came almost entirely from this source. Up to 1921 it was estimated that the world's total radium output was about 140 grammes (5 ounces), and of this total 100 grammes had been refined in the United States.

Commercial Extraction

An idea of the work involved in the extraction of carnotite—which was a sandstone into which various uranium salts in solution had infiltrated—was given by some figures issued by the Radium Chemical Co. of America. These showed that in order to obtain 1 gramme of radium element—an average of 500 tons of carefully sorted ore and the use of about 500 tons of various chemicals, the power from 1,000 tons of coal, the use of some 10,000 tons of purified acid distilled water, and the labour of 150 men for a month were required. This great undertaking, however, was at present closed down temporarily, owing to the recent developments at Katanga, on the Belgian Congo. Reference was next made to the radium mining operations in Cornwall. As the result of the discovery of a green vein of torbanite in the locality of Grampound, near Truro, mining operations were begun during 1878 at what is now called the South Terras mine. Up to 1912 this mine was exporting uranium ores to Germany for the extraction of uranium, after they had been hand-picked, crushed, and packed in barrels, so as to be in a convenient form for export. In 1913, however, when the demand for radium had begun to be considerable, arrangements were made by which the products of the mine were sent to France for the extraction of radium at Giff.

During the war the mine was shut down until 1920, when the present factory was erected at South Terras, the workings were pumped clear of water and underground operations resumed. At the present time the mine is producing from 200 to 300 milligrammes of radium per month, and employs about 20 men, the only instance where radium is being produced at the mine itself.

The paper finally considered the largest and most important organisation for the preparation of radium salts in the world, namely, that under the control of the Compagnie Radium Belge. During the mining operations for copper, carried out in the Belgian Congo by the Union Minière du Haut Katanga—of which the Compagnie Radium Belge was a branch—vast quantities of uranium-bearing ores have been discovered. They are of a mixed type and quality but for the most part they are easily workable. Up to the end of 1922, four-fifths of the world's supply came from the United States, but it was understood that at the pre-

sent time no less than 96 per cent. of the total radium produced came from the Belgian Congo. The ore, after sorting, was packed in sacks and shipped to Oolen, near Antwerp, where it was crushed and chemically treated for the extraction of the radium. Broadly speaking, the method of extraction consisted in bringing the radium into a form in which it might be readily separated from the other metals present. Treatment with sulphuric acid converted the radium into a sulphate, and the addition of barium and suitable washing enabled the other constituents to be removed and the radium, and barium to be separated. The next step consisted in the conversion of this mixture into a suitable form for treatment with hydrochloric acid, the two substances being finally separated from the solution by fractional crystallisation. In the end radium chloride was obtained of great purity, and used either in this form, as bromide, or more commonly as sulphate.

The future of the industry, concluded the author, depends chiefly upon the results of the more extended medical investigations in radium that are everywhere being carried out at the present time.

Germany's Dye Industry

Losing Hold on World Markets

GERMANY'S grip on world dye markets has loosened perceptibly since the introduction of the rentenmark. Costs of production in Germany are mounting, and it is apparent that wages must continue to increase for some time to come before they reach a level that will be reasonably equitable, according to *Chemical and Metallurgical Engineering*.

The Interessens Gemeinschaft is known to have lost half of its pre-war foreign business and admits that no profits are accruing from the present volume of its business. The loss of markets to American manufacturers is explained by saying that they are selling at a loss. The I. G. contends that these losses are easily absorbed because of the profits possible in the highly protected domestic market in the United States. German stocks of dyes are said to be large. Capital is too scarce to permit of the sale of any of these reserves at a loss, particularly when these stocks would have to be replaced at higher costs. The feeling is that the very existence of these stocks gives them some control over the market. The hope of the German dye makers is that manufacturers in other countries will raise prices, or that they may be able to negotiate sufficient foreign loans to enable them to sell at a loss in certain markets until competition is driven out.

An Agreement with Great Britain?

The Cartel is in process of reorganisation. Determined steps are being planned for the recovery of foreign markets. Hope still is entertained that an arrangement can be made with the British which will make it easier to compete with the Americans. Another expedient being considered is the operation of plants in Norway, where cheap water power is available. Also in case of another war such plants would be in a country likely to remain neutral. Consideration also is being given to the erection of dye plants in China and Spain.

If American dyes cannot be driven out of foreign markets, the Germans then are planning to attempt to induce American manufacturers, as a whole, to agree to a division of world markets, much the same as has been done by the Sulphur Export Association and the Italian producers. If that plan, in turn, should fail, the final alternative under consideration, would be the establishment of plants in the United States.

Imperial Institute Changes

A BILL is to be laid before Parliament by the Colonial Secretary to give effect to the scheme of reorganisation under which the Imperial Institute and the Imperial Mineral Resources Bureau will be amalgamated. The total annual cost of maintaining the combined institution (including the expenses of the exhibition galleries) is estimated at £44,000. Towards this expenditure the Institute will provide from its own resources about £6,000 per annum. An annual contribution of £5,000 for a period of five years having been promised from a private source, £33,000 remains to be raised by fixed annual grants by the various Governments of the Empire. The United Kingdom's share is estimated at a sum not exceeding £12,000 per annum, of which £9,000 will be provided for the main work of the Institute and the remainder as a contribution towards the upkeep of the galleries.

From Week to Week

GENERAL FRIES has been re-appointed chief of the U.S. Chemical Warfare Service.

DR. W. HIEBER, of Würzburg, has been appointed director of the department of inorganic chemistry at the University of Jena.

A NEW COMPANY is being formed for the manufacture of artificial silk by the viscose process at the mills of the old Kent Silk Mills, Ltd., at Sidcup, Kent.

DR. E. FYLEMAN gave a lecture on "Some Consideration of Dyeing Processes" to members of the Midland Section of the Society of Dyers and Colourists at Nottingham University College on Thursday, February 26.

A SERIOUS FIRE destroyed the works of the Bedford Chemical Factory Co., at Bedford, on Tuesday night. All the employees will be out of work as a result. The fire is thought to have been caused by an electric wire fusing.

THE ASSOCIATED PORTLAND CEMENT MANUFACTURERS have placed an order for three kiln shells each 250 ft. long, which will be the largest yet installed in this country, for Bevan's works, with Vickers, Ltd., Barrow-in-Furness.

THE DEPARTMENT OF GLASS TECHNOLOGY of Sheffield University is altering and adapting for research work a factory at Darnall, Sheffield. The factory will be equipped with modern plant for research on a large scale, primarily in the interests of the glass industry of Yorkshire.

THE PAINT AND VARNISH INDUSTRY in the Ruhr territory is experiencing continued depression. In the first six months of 1924 trade was so bad that many firms found it almost impossible to continue, but now that the volume of business has improved somewhat there is such extensive price-cutting that the outlook is still far from satisfactory.

ARRANGEMENTS, it is stated, are being made to bring about a further amalgamation of important Chilean nitrate companies. The movement towards consolidating and strengthening the position of the Anglo Chilean companies have been proceeding for some time, and it has lately received a stimulus from the activity of American interests in extending their properties.

A NEW RUBBER FINISH offering resistance to heat, grease, oil, petrol, acids, and alkalis has been produced by Louis Minton, of Trevelyan Buildings, Manchester, and marketed under the name of "Mintite." These properties, coupled with the fact that "Mintite" is a finish obtained quite inexpensively during the process of manufacture, make the product of interest to all concerned with rubber manufacture and application.

CANADA'S CHEMICAL TRADE with the United Kingdom is reflected in the official trade figures for 1924 recently published. The value of imports of chemicals and allied products totalled \$24,586,574, of which \$4,125,785 worth was from the United Kingdom and \$16,218,391 from U.S.A. On the export side the total value was \$15,430,672, of which \$3,574,961 worth was sent to England and \$7,450,768 to the U.S.A.

MR. W. A. WALMSLEY, B.Sc., manager of the Glasgow Corporation Chemical Works for the past 5½ years, was entertained to dinner in the Central Station Hotel by a company of business men and presented with a handsome gift on the occasion of his leaving to take up the position of managing director of a North of England firm. Mr. Walmsley was also the recipient of a farewell present from the staff and employees of the department.

MR. E. HARLAND HUTCHINSON, who has for many years specialised in burning coal in pulverised form, has accepted an executive position with Vickers and International Combustion Engineering, Ltd., of Africa House, Kingsway, W.C.2, owners of the well-known "Lopulco" patented system of pulverised fuel firing. He will have charge of the development of the firm's interests in the Dominions and Colonies, and will shortly proceed to Australia via U.S.A. and Canada.

ON TUESDAY NEXT, March 10, at 5.15 p.m., Professor E. N. da C. Andrade begins a course of two lectures at the Royal Institution on "The Evolution of the Scientific Instrument," and on Thursday, March 12, Dr. Leonard Hill delivers the first of two lectures on "The Biological Action of Light." The Friday Evening Discourse on March 13 will be delivered by Professor Gilbert Murray on "The Beginnings of the Science of Language," and on March 20, by Professor J. W. McBain, on "Soaps and the Theory of Colloids."

JANUARY SALES of the German Potash Syndicate totalled 182,380 tons.

A GERMAN potash syndicate is said to be organising a branch company in Holland.

A NEW PORTLAND CEMENT FACTORY, with an output of 1,000 tons per week, is to be erected near Cambridge.

MR. JOHN RUSSELL, general secretary of Brotherton and Co. Ltd., Leeds, has been made a director of the company.

ORDERS VALUED AT OVER £5,000,000 are estimated to have been placed as the result of the British Industries Fair at Birmingham.

THE 1921 CENSUS FIGURES just published for England and Wales state that 197,677 workers were employed in the chemical, dye, explosive, and paint industries.

COMMANDER CHARLES WORTHINGTON CRAVEN, who has been a special director in charge of the Vickers' works at Barrow-in-Furness, has been elected to the board of Vickers, Ltd.

DAMAGE to the extent of about £5,000 was caused by fire at the works of the Thorncliffe Distillation Co., near Sheffield, on Saturday, February 28. The benzol house was completely burnt out.

SIR MAX MUSPRATT and Mr. S. Courtauld are members of the Federation of British Industries deputation which is to interview the Chancellor of the Exchequer on March 12 on the subject of industrial taxation.

MR. R. WADDINGTON, a member of the Dyestuffs Advisory Licensing Committee, states that the principal users of dyestuffs in this country are taking over 80 per cent. of their requirements from British dyemakers.

WOOLWICH ARSENAL suffered extensive damage by fire on Wednesday evening. Several buildings, including the anti-gas factory, were destroyed and only the direction of the wind saved the research department and the explosives factories.

THE SOCIETY OF CHEMICAL INDUSTRY at Basle, Switzerland, has announced new intermediates for the manufacture of anthraquinones and anthracenes from which new indigoid dyestuffs, giving a variety of shades, can be produced.

SIX TANKS containing 10,000 gallons of naphthalene and creosote were involved in a fire on Monday at the ironworks of Newton, Chambers, Ltd., at Chapelton, near Sheffield. The flames rose to a height of 80 ft. and could be seen for miles around.

APPLICATIONS ARE INVITED by the Leathersellers' Company's Technical College, 176, Tower Bridge Road, London, S.E.1, for the post of chemical lecturer and demonstrator. Candidates must possess a good science degree, but a knowledge of leather is not essential.

WE HAVE RECEIVED from King's Patent Agency, Ltd., of 146A, Queen Victoria Street, London, E.C.4, a handy diary. The principle of allotting a complete page to each day gives ample room for notes, and the usual reference information is also included and adds to the utility of the production. The diary is well bound and of convenient pocket size.

UNDER A WINDING-UP ORDER made against John J. Clark and Co., Ltd., wholesale and retail chemists and druggists, 18, Southwark Street, London, S.E., on November 4, on the petition of May Roberts and Co., Ltd., druggists' sundriesmen, Clerkenwell Road, London, the statutory meetings of creditors and shareholders were held on February 25 at the Board of Trade offices. The failure of the company was attributed to high rental and rates and to the failure of the sales to realise expectations. According to the statement of affairs the liabilities amounted to £709 and the assets were valued at £8 19s. 6d. The meetings resulted in the liquidation remaining in the hands of the Official Receiver.

THERE WAS A FURTHER MENTION in the Chancery Division on Friday, February 27, of the motion in the action by the British Oxygen Co., Ltd., against Liquid Air, Ltd., which it was stated at a previous hearing was for an injunction restraining the defendants from publishing a letter to one of the plaintiff company's customers making a quotation for supplying oxygen. It was then alleged that this letter had been used on the Stock Exchange. Mr. McGillivray said Mr. Upjohn was against him in this matter and he was unable to be present. Sir Henry Slessor, K.C., was also in it and he was unable to be present either. He therefore asked that the motion stand over for another fourteen days. His lordship agreed.

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Abstracts of Complete Specifications

228,220. WATER-SOLUBLE PHOSPHATES, MANUFACTURE OF. J. C. Williams, 2, Melbourne Road, West Bridgford, Notts, and J. T. Millar, 24, Inverness Terrace, London, W.2. Application date, September 28, 1923.

The object is to obtain a higher degree of conversion of insoluble phosphates into soluble phosphates than in the usual process. Hydrated precipitated calcium phosphate is treated with a solution of sulphuric or phosphoric acid, and the sulphate of an alkali metal or ammonium, or a solution of an acid sulphate of an alkali metal, *e.g.*, nitre cake, or of ammonium. In using nitre cake, the normal sulphate may be transformed into the acid sulphate by adding the necessary quantity of sulphuric acid, and it is found that a slight excess of acid enables a higher degree of conversion of the original phosphate to be obtained. The phosphate employed must be hydrated, and may be the by-product obtained from the manufacture of gelatine. The starting material is preferably dicalcium phosphate which does not contain any substantial proportion of tricalcium phosphate.

In an example, precipitated dicalcium hydrogen phosphate is treated with ammonium phosphate and sulphuric acid, and then filtered. The filtrate contains acid ammonium sulphate, a small quantity of calcium salts, and dihydrogen ammonium phosphate. The yield is about 95 per cent. It has been found that the temperature or concentration of the materials does not affect the degree of final conversion, provided that the precipitated phosphate is hydrated. The reaction proceeds more quickly if the temperature is increased. This process is particularly suitable for the commercial production of acid sodium pyrophosphate and ammonium phosphates.

228,231. COMPRESSED GAS, PROCESS FOR THE PRODUCTION OF—BY ELECTROLYSIS. E. Hausmeister, Goppingen, Wurttemberg, Germany. Application date, October 23, 1923.

It has been found that when obtaining gas under pressure by electrolysis, the gas is not always obtained pure even if diaphragms are employed between the electrodes, and the impurity usually increases with an increase of the working pressure. This impurity is due to a differential absorption of the gases in the electrolyte, and the subsequent withdrawal of gas at different pressures. If the pressure during withdrawal of gas is less than the pressure of absorption, both of the gases dissolved are liberated, so that the gas obtained at either electrode contains a proportion of the gas which is electrically produced at the other electrode. In this invention, the difficulty is avoided by placing automatic regulating valves in the pipes for the withdrawal of gas, so that the gas pressure in the regenerator remains constant; or the intensity of current in the generator may be regulated so that the current increases when the pressure tends to fall. The fall of pressure which occurs on recharging the electrolyte may be avoided by supplying the electrolyte under pressure.

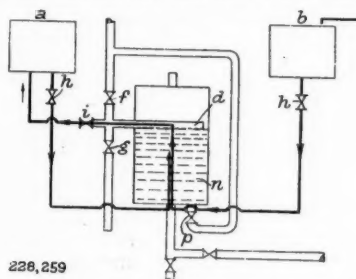
228,244. CRUDE OXIDE AND CARBONATE OF ZINC, PROCESS FOR TREATING. W. T. Gidden, Abbey Road, Smethwick, Staffordshire, W. G. Ragg, Lordswood Road, Harborne, Birmingham, and Chance and Hunt, Ltd., Oldbury, Worcestershire. Application date, October 29, 1923.

Crude carbonate or oxide of zinc is dissolved in a solution of ammonia or ammonium carbonate, and the zinc content recovered by sudden dilution of the solution and distillation of the ammonia. It is found that without the dilution the zinc product is in a dense condition, but that with dilution a light and bulky product is obtained. Ammonium carbonate is employed as a solvent when zinc oxide is treated, since the latter is not appreciably soluble in pure ammonia. The sulphates which are usually present in crude zinc oxide can be removed prior to the distillation of the ammonia by adding a slight excess of alkali or alkali carbonate. If the raw material is derived from roasted natural sulphides of zinc ores or concentrates, it may contain lead, copper, cadmium, cobalt, and manganese. The manganese may be eliminated by treating with air to produce the oxide or hydrated oxide of manganese. The lead, copper, cadmium, and cobalt may be eliminated by treating the solution with zinc, but if lead

and copper are absent, the zinc must be activated by treating with a solution of a salt of these metals in order to precipitate the cobalt. As an alternative, the copper and cadmium may be precipitated by means of ammonium sulphide or sulphuretted hydrogen. If calcined zinc blende is the raw material, zinc in the form of ferrite will not be dissolved in the ammoniacal solution. Several examples of the treatment of crude zinc products are given, the yield of zinc oxide being about 97.7 per cent.

228,259. BASE-EXCHANGING BODIES, REGENERATION OF. United Water Softeners, Ltd., and S. V. H. Lassen, Imperial House, Kingsway, London, W.C.2. Application date, October 31, 1923.

This process is for regenerating base exchanging substances, which are used for softening hard water by removing calcium and magnesium salts, and one of the objects is to enable the brine employed for the regeneration to be used repeatedly. The partly-spent brine flows from a tank *a* through a valve *h* into the base exchanging material *n* and displaces water



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through a perforated pipe *d* and valve *g*. The solution is then displaced upwards from the material by water admitted through the valve *p* at the bottom. The brine returns through a valve *i* to the vessel *a*, the valve *g* being closed. The valve *i* is then closed, and the material *n* washed either upwardly or downwardly through valves *p* or *f*. A fresh solution is contained in the tank *b* for the next regenerating operation, and the two solutions are used alternately until one is completely spent. A practical plant for operating according to this process is described in detail.

228,301. CONCENTRATING SOLUTIONS OF VOLATILE SUBSTANCES, PROCESS OF. F. E. Lichtenthaler, 173, Milk Street, Boston, U.S.A. Application date, December 4, 1923.

In this process, a dilute solution of a volatile substance is treated with an amount of anhydrous hydrate-forming salt in a powdered state in excess of that necessary to absorb the water content of the solution. This substance is added gradually to avoid excessive rise of temperature. The hydrated salt crystallises, and it may become a solid mass containing the water-soluble volatile substance. The material is powdered and placed in a series of containers, and a saturated solution of the hydrate-forming salt is passed through the containers in succession. This solvent removes the volatile substance in decreasing quantities as it passes through the series of containers, and at intervals the first container is removed and a new container added at the end. The process is suitable for treating aqueous ethyl alcohol, methyl alcohol, formic acid, acetone, acetic acid, methyl acetate, etc. The hydrate-forming salt may be calcium chloride, iron sulphate, copper sulphate, sodium sulphate, alum, or aluminium sulphate. If the solution to be treated is not acid, borax may be used as the hydrate-forming salt.

An example is given of the concentration of acetic acid by this process. A 10 per cent. solution is obtained by the vinegar process from molasses, and is purified by filtering. The dilute acid is mixed with anhydrous ammonium alum in the proportion of 125 parts of the alum to 100 parts of the acid. The anhydrous alum is produced by boiling off the water of crystallisation of the hydrated alum while keeping the temperature below that at which decomposition takes place. The solid product, containing free acetic acid, is then

pulverised, and treated in a series of containers with a saturated solution of alum, and the strong acid is displaced by the solvent. The saturated solution of alum deposits alum as it takes up acetic acid, and a highly concentrated acetic acid is obtained. The alum may then be dehydrated for use again. The acetic acid is adapted for further dehydration or distillation for the production of glacial acid.

228,348. VISCLOSE FOR THE MANUFACTURE OF ARTIFICIAL SILK, PROCESS FOR THE PURIFICATION OF. P. Bader, 11, Elsenstrasse, Berlin-Treptow, H. Eggert, Woltersdorf, near Erkner, and A. Wagner, 9, Engelufer, Berlin, S.O.16. Application date, February 9, 1924.

Viscose which is made by the action of carbon bisulphide and alkali on cellulose followed by the polymerisation or "ripening" of the cellulose xanthogenate molecules, may contain considerable quantities of alkali sulphide. When the viscose is precipitated in a sulphuric acid solution to produce artificial silk, the alkali sulphide is decomposed with liberation of sulphuretted hydrogen, and the cellulose product is adversely affected. In this invention, the alkali sulphide is oxidised by means of hydrogen peroxide or alkali peroxides, persulphates, or similar per-salts. The quantity of oxidising agent used is only sufficient to oxidise the impurities present. If the crude solution thus treated is mixed with sulphuric acid to form cellulose hydrate, no sulphuretted hydrogen is evolved and the quality of the product is much improved. It has been found that this treatment does not oxidise the cellulose itself, and the enrichment of the sulphuric solution with sulphates, etc., has no adverse action.

228,390. SOAPS AND DETERGENT PREPARATIONS, PROCESS FOR THE MANUFACTURE OF. R. Vidal, 10, Rue de la Comete, Asnieres (Seine), France. Application date, April 1, 1924.

In this process, a detergent liquor is obtained by making a concentrated or diluted aqueous solution of soap from hydroxylated fatty acids such as ricinoleic acid, oxystearic acid, oxystearic acid, etc., and adding simple fatty acids such as oleic acid, or the acids of oleine and/or of copra oil. Olefins, naphthas, paraffins, and/or other hydrocarbons may also be added.

228,459. SOAPS AND OTHER SAPONACEOUS COMPOUNDS, DETERGENTS, BLEACHING COMPOUNDS, ETC. The Patent Borax Co., Ltd., and J. S. Morgan, Ledsam Street, Ladywood, Birmingham. Application date, August 20, 1924.

Hard and soft soaps, soap powders, polishing soaps, and other saponaceous compounds, detergents, bleaching compounds, etc., may have their antiseptic, detergent, and water-softening properties increased by incorporating 2-10 per cent. of sodium pentaborate. The sodium pentaborate is obtained by treating caustic soda solution with orthoboric acid. The mixture is heated to 160° F. until the liquid becomes clear, and it is then allowed to cool, when sodium pentaborate crystallises out. The proportions employed are caustic soda 8 parts, water 40 parts, orthoboric acid 62 parts. Alternatively, the orthoboric acid may be replaced by metaboric acid 44 parts, or pyroboric acid 39.5 parts, or sodium baborate 38.2 parts and orthoboric acid 99.2 parts, or the caustic soda and orthoboric acid may be fused together. For normal purposes, 2 per cent. of sodium pentaborate is found satisfactory.

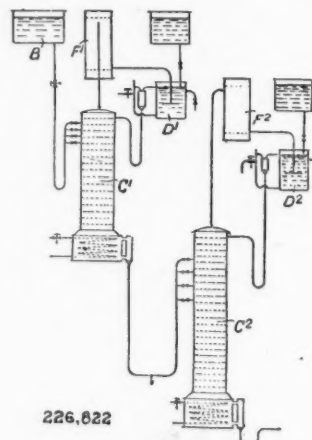
NOTE.—An abstract of the following specification which is now accepted, appeared in THE CHEMICAL AGE when it became open to inspection under the International Convention:—213,252 (J. Perten) relating to manufacture and regeneration of charcoal of high decolorising power, see Vol. X, p. 547.

International Specifications not yet Accepted

226,822. DEHYDRATING ORGANIC ACIDS. Soc. Anon. des Distilleries des Deux-Sèvres (formerly Soc. Ricard, Allenet, et Cie), Deux-Sèvres, France. International Convention date, December 28, 1923.

In the process of distilling organic acids in presence of liquids which form azeotropic mixtures, the distillation is effected in two stages, using an added liquid of high and low boiling point respectively. In an example, a 10% solution of acetic acid passes from a tank B to a still C¹ where it is distilled in presence of xylene. The vapour is recovered in a condenser F¹ and passes to a settling vessel D¹. The upper layer consisting of xylene is returned to the still, and the lower

layer is discharged. The partly dehydrated acid from the bottom of the still C¹ passes to another still C² where it is distilled with benzol. The vapour passes to a condenser F² and thence to a settling vessel D², and the upper layer of benzol is returned to the still.



A 10% solution of formic acid may be dehydrated using butyl formate in the first stage, and gasoline or petrol in the second stage. A 10% solution of acrylic acid is similarly dehydrated using solvent naphtha and butyl chloride.

226,836. VULCANISING COMPOSITIONS. Dovan Chemical Corporation, 30, Church Street, New York. Assignees of M. L. Weiss, 45, Lincoln Avenue, Newark, N.J., U.S.A. International Convention date, December 29, 1923.

Vulcanising accelerators are obtained by treating disubstituted guanidines with disubstituted dithiocarbamic acid. These substances are produced by condensing a secondary amine with carbon disulphide in presence of the guanidine radicle, or by treating a guanidine salt with a metallic salt of disubstituted dithiocarbamic acid. The products are added to rubber in the proportion of about 0.5 per cent., and vulcanisation is completed in about 15 minutes at 230° F. An example is given of the use of the product obtained from diphenyl or ditolyl guanidine and dimethyl-dithiocarbamic acid.

227,084. PURIFYING OILS. R. Cross, 700, Baltimore Avenue, Kansas City, Mo., U.S.A. International Convention date, December 31, 1923.

Gasoline, naphtha, benzene or kerosene may be purified by passing the liquid or vapour through a mixture of a highly adsorbent inorganic material and a metal or its oxide or salt, e.g., copper, iron, lead, manganese, zinc, or antimony. Suitable adsorbents comprise aluminium silicates and zeolites, e.g., bentonite, fuller's earth, green sands, permutite, refinite, borromite, heulandite, phillipsite, hormatone, stilbite or desmine, laumontite, chabazite, analcite, natrolite, scolocite, Thomsonite, pyrophyllite, and the gels produced by treating sodium aluminium silicate or copper aluminium silicate with sulphuric acid. The preferred mixture is obtained by dissolving the metal salt in water, alcohol, glycerine, ethylene-glycol, or other liquid which does not dissolve, or dissolve in, the hydro-carbon, adding a colloidal clay, and heating to 250°-1200° F.

227,089. SPLITTING FATS. J. D. Riedel Akt.-Ges., 1, Riedelstrasse, Britz, Berlin. International Convention date, January 5, 1924.

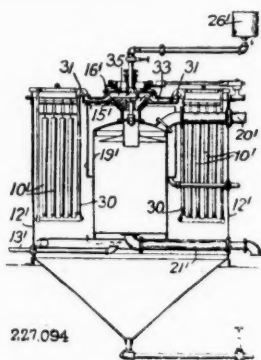
Fats are decomposed into fatty acids and glycerine by means of a mixture of an organic sulpho compound and a porous body such as Kieselguhr, fuller's earth, animal charcoal or active charcoal. Thus, beef tallow may be boiled with sulphuric acid and a powder comprising Twitchell's reagent 1 part, and Kieselguhr 1.5 parts. Other splitting agents may be mineral oil sulpho acids, aromatic sulpho acids as described in specification 224,869 (see THE CHEMICAL AGE, Vol. XII, p. 86), or derivatives containing halogens, nitro groups, or carboxylic groups.

227,090. ALKALINE EARTH ARSENATES. Soc. Chimique des Usines du Rhône, 21, Rue Jean-Goujon, Paris. International Convention date, January 3, 1924. Addition to 216,098. (See THE CHEMICAL AGE, Vol. XI, p. 101.)

Alkaline earth arsenates may be obtained by heating the arsenite in a rotary kiln to 600°-700° C. or higher, in the presence of oxygen. The air may be heated before passing over the material, or combustion gases containing an excess of oxygen may be passed over it. Suitable gases are those obtained from a pulverised coal burner, with excess of oxygen, or with addition of air.

227,094. FILTERING LIQUIDS. General Engineering Co., 159, Pierpont Street, Salt Lake City, Utah, U.S.A. (Assignees of A. L. Genter, 159, Pierpont Street, Salt Lake City, Utah, U.S.A.) International Convention date, January 2, 1924.

Hot liquids or liquids containing gases are treated in suction filters in short alternating periods of suction and counter-pressure. The separation of gas or vapour in the filtrate spaces is thus reduced, and the filtering medium is cleaned,



The liquid to be filtered is introduced through a pipe 13¹ and passes through filtering elements 10¹ suspended in radial frames 30 in a tank 12¹. The receiver 19¹ is connected to a vacuum pump and condenser by a pipe 20¹, and the filtrate is drawn into it through passages 31, 33. A rotary plug valve 16¹ is provided to control the radial passages 33, so that one or more may be cut off from the receiver and connected to a vessel 26¹ which contains filtrate to cleanse the filter by counter-flow. The valve 16¹ is automatically rotated by pawl and ratchet mechanism.

227,107. ACID-PROOF VESSELS. W. Eberlein, Victoria Avenue, Brompton Lane, Bredbury, Stockport. International Convention date, January 4, 1924.

Vessels of concrete or porous stone are made acid-resisting by treatment with a molten mixture of sulphur and precipitated silicic acid, which gives them a vitreous coating. The silicic acid may be in the form of Kieselguhr or Kieselkreide, rendered free from acid-soluble material.

LATEST NOTIFICATIONS.

229,640. Process for the production of sodium bicarbonate and sal-ammoniac. Ges. für Kohlentechnik. February 21, 1924.

229,668. Manufacture of new dyestuffs of the anthraquinone series. Farbenfabriken vorm. F. Bayer and Co. February 18, 1924.

229,674. Process of producing plastic masses from cellulose derivatives. Balke, P., and Laysieffer, G. February 18, 1924.

229,678. Process for the production of alkali cellulose. Hawlik, H., and Sindl, O. February 18, 1924.

229,619. Process for the purification of pine tars and resin oils. Wohl, Dr. A., Goldschmidt, Dr. A., and Prill, Dr. A. February 19, 1924.

229,623. Process for the manufacture of soluble starch products. Chemische Fabrik Pyrgos Ges., and Haller, R. February 21, 1924.

Specifications Accepted with Date of Application

205,503. Monoazo dyestuffs, Manufacture of. A. G. Bloxam. (Farbwerke vorm. Meister, Lucius and Brünig.) October 12, 1923.

207,174. Electrolytic processes, Methods of carrying on. Siemens and Halske Akt.-Ges. November 15, 1922.

210,395. Liquid mixtures, Process and apparatus for separating volatile ingredients from. Naamlooze Venootschap Koninklijke Stearine Kaarsenfabriek Gouda. January 27, 1923.

213,895. Sulphuric acid, Process for the production of. Metal Traders, Ltd., April 7, 1923.

216,083. Organic lead compounds, Manufacture of. General Motors Research Corporation. May 19, 1923.

217,565. Coke ovens. H. Koppers. June 13, 1923. Addition to 204,345.

219,989. Air, Separation of the elements. Soc. l'Oxylithe. July 31, 1923.

221,512. Ethyl-sulphuric acid, Process for producing. Compagnie de Bethune, Soc. Anon. September 7, 1923.

224,199. Lead acetate, Production of. R. Plaelen. October 30, 1923.

220,279. Steel, Devices for manufacturing. F. Krupp Akt.-Ges., Friedrich-Alfred-Hütte. August 8, 1923.

224,505. Ammonium and potassium salts, Production of. Soc. Chimique de la Grande Paroisse. (Azote and Produits Chimiques.) November 8, 1923.

228,954. Active carbon, Processes for the production of. J. N. A. Sauer and Algemeene Norit Maatschappij. August 9, 1923.

228,959. Oxygenated organic compounds, Manufacture of. J. Y. Johnson. (Badische Anilin und Soda Fabrik.) August 23, 1923.

228,963. Peat, Treatment of—and production of gas and by-products therefrom. K. B. E. Eller. September 14, 1923.

228,992. Valves for pulpy material and apparatus for flotation concentration. W. W. Stenning and Minerals Separation, Ltd., November 14, 1923.

228,993. Peat, Process and apparatus for the treatment of. F. M. Perkin and Bettisfield Trust Co., Ltd. November 14, 1923.

228,994. Calcium oxalate from vegetable material, Recovery of. H. Wade. (W. A. Fraymouth and Bhopal Produce Trust, Ltd.) November 14, 1923.

229,021. Diatomaceous earth, Treatment of. F. W. Golby. (Celite Co.) November 22, 1923.

229,042. Coal gas and water gas, Manufacture of. J. Neath and W. Chaney. December 14, 1923.

229,158. Pulverisation of substances. H. A. Procter, A. E. Young, and R. J. Iliffe. May 17, 1924.

229,192. Acid calcium lactate, Process for manufacturing. J. A. von Wulff, and A. Busch. July 23, 1924.

Applications for Patents

Battersby, J. W., Chemical Engineering Co. (Manchester), Ltd., and Spensley, J. W. Separation of vegetable substances. 4993. February 23.

Battersby, J. W., Chemical Engineering Co. (Manchester), Ltd., and Spensley, J. W. Separation of oils or fats. 5128. February 23.

Calder, W. A. S., and Chance and Hunt, Ltd. Means for separating solid particles from gases. 5129. February 24.

Chemische Fabrik auf actien vorm. E. Schering. Manufacture of acridine compounds. 5382. February 26. (Germany, February 29, 1924.)

Consortium für Elektrochemische Industrie Ges. Manufacture of acetic anhydride. 5107. February 24. (Germany, February 25, 1924.)

Farbenfabriken vorm. F. Bayer and Co. Manufacture of pharmaceutical products. 5502. February 27. (Germany, March 21, 1924.)

Farbwerke vorm. Meister, Lucius and Brüning. Manufacture of condensation products of the anthraquinone series. 4999. February 23.

Flor, K., Lichtenberger, T., and Salzwerk Heilbronn Akt.-Ges. Process of effecting decomposition of alkali-chlorides. 5072. February 24. (Germany, March 19, 1924.)

Krantz, N., and Moltke-Huitfeldt Graf de. Treatment of crude phosphates. 5558. February 28.

Planchon, V. Manufacture of nitrated cellulose from wood pulp. 5479. February 27. (France, February 29, 1924.)

Schmidt, K. F. Production of derivatives of hypothetic imine. 5474. February 27.

Small, G. G., and Walker, W. J. Manufacture of oxalic acid from cellulosic waste. 5198. February 25.

Soc. of Chemical Industry in Basle. Manufacture of dyestuffs, etc. 5487. February 27. (Switzerland, March 20, 1924.)

Thermal, Industrial, and Chemical (T.I.C.) Research Co., Ltd. Heat-treatment of materials for distillation, etc. 5486. February 27.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, March 6, 1925.

THERE is little of interest to report during the past week, business continuing on steady lines with very few fluctuations in price. The demand for a number of products continues fairly active. Export inquiry is still restricted.

General Chemicals

ACETONE.—No improvement is reported in the demand and the price is nominally £75 per ton, ex wharf London.

ACID ACETIC has been in normal request, price without change at £41 per ton for 80% technical and £42 per ton for 80% pure.

ACID CITRIC has been a little more active, with price firm at 1s. 5d.

ACID FORMIC.—There has been an improved demand, price showing no change at £51 10s. per ton to £52 per ton, ex wharf for 85% technical quality.

ACID LACTIC has been in active request, and export demand is much better. Price is steady at £43 per ton for 50% by weight.

ACID OXALIC.—Some of the second hand parcels have been absorbed and the price stands firm at 3½d. per lb.

ACID TARTARIC.—Demand is expanding, although the price so far shows no improvement; an advance, however, is not unlikely as the demand develops.

ALUMINA SULPHATE.—Price still remains in buyers' favour and keen competition exists for any order offering.

ARSENIC.—The demand is practically negligible and price easier.

BARIUM CHLORIDE is persistently offered from the continent at lower prices, a fair amount of business has been booked, and price on the spot remains steady at £9 15s. to £10.

CREAM OF TARTAR.—Demand has improved, and price is steady at £76 to £80 per ton.

EPSOM SALTS continue in good request, and a large amount of business has been effected both for prompt and forward; an advance is not unlikely in this market.

FORMALDEHYDE.—No further reductions are reported, and price is now steady at £43 to £44 per ton, ex wharf. Makers are not disposed to make any further concessions, and the present price seems to be attracting more interest in the material.

LEAD ACETATE continues a bright feature of the market, being in steady request and price firm at £46 10s. to £47 per ton for white, and £44 per ton for brown.

LEAD NITRATE is unchanged, and a fair amount of business is passing.

LIME ACETATE is unchanged.

LITHOPONE is in better demand. Price steady at £19 to £20 per ton.

METHYL ALCOHOL.—The recent improved demand is maintained, and better business has been done at about £50 per ton, ex wharf.

POTASSIUM CAUSTIC is only in spasmodic demand at the lowest prices recently made.

POTASSIUM PERMANGANATE.—Business is confined to small quantities, and price is easier at 7½d. per lb., ex wharf.

POTASSIUM PRUSSIAN.—Business is exceedingly firm, and a satisfactory business has been concluded at about 8d. per lb., the forward position remaining firm, helping the spot price.

SODIUM ACETATE.—The demand has not been quite so active, and as a result the price has eased slightly to £21 10s. to £22 10s., ex wharf.

SODIUM HYPOSULPHITE.—A better demand has been experienced for the photographic quality, and no change in price is reported.

SODIUM PRUSSIAN.—A fair amount of the second hand material has gone into consumption, and the price is again firm at 4½d. per lb. Demand is improving.

Coal Tar Products

The market generally in coal tar products has a quiet tone, and there is little fresh business passing.

90% BENZOL, though still in good demand, is hardly so strong in price as it was last week, and its value to-day is from 1s. 10d. to 1s. 10½d. per gallon on rails.

PURE BENZOL is quoted at 2s. 1d. per gallon on rails.

CREOSOTE OIL.—The downward tendency in the price of this product is being continued, and its value is from 6d. to 6½d. per gallon on rails in the North, while the price in London is from 7d. to 7½d. per gallon.

CRESYLIC ACID remains unchanged from last week, and is quoted at 1s. 10d. per gallon on rails in bulk for the pale quality 97/99%, while the dark 95/97% is valued at about 1s. 7d. to 1s. 8d. per gallon.

SOLVENT NAPHTHA is firm at 1s. 4d. per gallon on rails.

HEAVY NAPHTHA remains unchanged at 1s. 1d. to 1s. 2d. per gallon on rails.

NAPHTHALENES are quiet, the lower grades being worth from £4 5s. to £4 15s. per ton. The higher quality, 76/78°, is quoted at £6 to £6 10s. per ton, and the 74/76° quality is valued at £5 10s. to £6 per ton.

PITCH.—The demand has again eased off somewhat, and prices show a downward tendency. To-day's approximate values are 40s. to 45s., f.o.b. London; 40s. to 42s. 6d. per ton, f.o.b. East and West Coasts.

Nitrogen Products Markets

Export.—During the last week the export demand from the Continent has continued and the producers were able to dispose of all they had available from £13 10s. to £13 15s. per ton, f.o.b. There have been inquiries in the market for forward positions but little business has resulted. It is anticipated that as the producers have smaller quantities available for March/May delivery there will be a slight upward movement of prices.

Home.—The home demand for February was disappointing. This was the inevitable consequence of the floods in various parts of the country. Towards the end of the month, however, orders reached the producers in greater volume. Despite this set back, it is anticipated that the home season will show an increase in consumption of 10,000 to 15,000 tons over last year. Home prices will remain unchanged until the end of May at £14 14s. per ton delivered to consumers' station in sellers' single bags, tare allowed.

Nitrate of Soda.—The Nitrate of Soda market remains unchanged. Cargoes for prompt shipment can be purchased at £11 15s. to £11 18s. per ton. Though nitrate is freely offered at these prices there is a tendency for buyers to hold off in the anticipation of a further drop. Under these circumstances the nitrate stocks in Europe tend to increase. The American consumption on the other hand is going ahead satisfactorily.

American Market Movements

(From Drug and Chemical Markets)

DEMAND for heavy chemicals only fair. Prussiates steady. Sodium sulphide firm. Formic acid easy. Epsom salts in large supply. Nickel salt and potassium perchlorate up. Light oil distillates show little change. Intermediates in poor demand with competition sharp. Phenol, cresylic acid, naphthalene and pyridine dull.

Fine chemicals are in demand, especially on contracts. Imported tartaric acid firmer. Fusel oil firmly held. Rise in Japanese exchange causes higher shipment prices in Japan.

Essential oils are in active demand with tendency for shipment prices to advance.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 to £23 per ton.
 Acid Boric, Commercial.—Crystal, £45 per ton, Powder, £47 per ton.
 Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
 Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
 Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
 Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
 Bleaching Powder.—Spot, £10 10s. d/d.; Contract, £10 d/d. 4 ton lots.
 Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.
 Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
 Calcium Chloride (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
 Copper Sulphate.—£25 to £25 10s. per ton.
 Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
 Nickel Sulphate.—£38 per ton d/d. Normal business.
 Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
 Potash Caustic.—£30 to £33 per ton.
 Potassium Bichromate.—5d. per lb.
 Potassium Chlorate.—2½d. to 3d. per lb.
 Sal ammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
 Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.
 Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
 Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
 Sodium Acetate 97/98%.—£24 per ton.
 Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
 Sodium Bichromate.—4d. per lb.
 Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
 Sodium Chlorate.—2½d. per lb.
 Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
 Sodium Nitrite 100% basis.—£27 per ton d/d.
 Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.
 Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.
 Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.
 Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbollic Crystals.—5½d. to 5½d. per lb. Quiet demand.
 Crude 60's, 1s. 6d. to 1s. 8d. per gall. Little demand.
 Acid Cresylic 97/99.—1s. 8d. to 2s. per gall. Pale, 95%, 1s. 7d. to 1s. 10d. per gall. Dark, 1s. 7d. to 1s. 9d. per gall. Markets quiet.
 Anthracene Paste 40%.—4d. per unit per cwt.—Nominal price. No business.
 Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.
 Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons. Supplies very scarce.
 Toluol.—90%, 1s. 7d. to 1s. 7½d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall. Steady demand.
 Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
 Creosote.—Cresylic, 20/24%, 8½d. to 9d. per gall. Better demand.
 Middle Oil, Heavy, Standard specification, 6d. to 7d. per gall., according to quality and district. Market firmer. Steady demand.
 Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 3d. to 1s. 7d. per gall. Demand good. Solvent 90/190, 11½d. to 1s. 1d. per gall. Steady business.
 Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand rather better. Whizzed or hot pressed, £6 to £9 per ton.
 Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts.
 Pitch.—Medium soft, 40s. to 45s. per ton, according to district. Not much business.
 Pyridine.—90/160, 18s. to 18s. 6d. per gall. Not much demand. Heavy, 11s. to 12s.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
 Acid H.—3s. 9d. per lb. 100% basis d/d.
 Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
 Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
 Acid Salicylic, technical.—1s. per lb. Price reduced. Improved demand.
 Acid Sulphanilic.—9d. per lb. 100% basis d/d.
 Aluminium Chloride, anhydrous.—10d. per lb. d/d.
 Aniline Oil.—8d. per lb. naked at works.
 Aniline Salts.—8d. per lb. naked at works.
 Antimony Pentachloride.—1s. per lb. d/d.
 Benzidine Base.—3s. 8d. per lb. 100% basis d/d.
 Benzyl Chloride 95%.—1s. 1d. per lb.
 p-Chlorophenol.—4s. 3d. per lb. d/d.
 p-Chloraniline.—3s. per lb. 100% basis.
 o-Cresol 29/31° C.—3d. to 3½d. per lb. Demand quiet.
 m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
 p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
 Dichloraniline.—2s. 3d. per lb.
 Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
 p-Dichlorobenzol.—£85 per ton.
 Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
 Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.
 Dinitrobenzene.—9d. per lb. naked at works.
 Dinitrochlorobenzol.—£84 10s. per ton d/d.
 Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.
 Diphenylaniline.—2s. 10d. per lb. d/d.
 G. Salt.—2s. 2d. per lb. 100% basis d/d.
 Monochlorobenzol.—£63 per ton.
 a-Naphthol.—2s. 3d. per lb. d/d.
 B-Naphthol.—1s. per lb. d/d.
 a-Naphthylamine.—1s. 3½d. per lb. d/d.
 B-Naphthylamine.—3s. 9d. per lb. d/d.
 m-Nitraniline.—4s. 2d. per lb. d/d.
 p-Nitraniline.—2s. 2d. per lb. d/d.
 Nitrobenzene.—5½d. to 5½d. per lb. naked at works.
 o-Nitrochlorobenzol.—2s. 3d. per lb. 100% basis d/d.
 Nitronaphthalene.—10d. per lb. d/d.
 p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
 p-Nitro-o-amido-phenol.—4s. 6d. per lb. 100% basis.
 m-Phenylene Diamine.—4s. per lb. d/d.
 p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
 R. Salt.—2s. 4d. per lb. 100% basis d/d.
 Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
 o-Toluidine.—10d. per lb.
 p-Toluidine.—2s. 4d. per lb. naked at works.
 m-Tolylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Market depressed. Short hours in Lancashire cotton trade are a handicap to business in acetates.

Acetate of Lime.—Brown £11. Quiet market. Grey, £15 10s. per ton. Firmer. Liquor, 9d. per gall. 32° Tw.
 Acetone.—£78 per ton.
 Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Fair demand.
 Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
 Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
 Wood Creosote.—2s. 9d. per gall. Unrefined.
 Wood Naphtha, Miscible.—4s. 9d. per gall. Only moderate market. 60% O.P. Solvent, 5s. per gall. 40% O.P.
 Wood Tar.—£4 to £5 per ton. Demand slack and stocks being held.
 Brown Sugar of Lead.—£43 10s. per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.
 Arsenic Sulphide, Yellow.—2s. per lb.
 Cadmium Sulphide.—4s. 4d. per lb., according to quantity.
 Carbon Bisulphide.—£32 to £35 per ton, according to quantity.
 Carbon Black.—6d. to 6½d. per lb., ex wharf.
 Carbon Tetrachloride.—£62 to £67 per ton, according to quantity, drums extra.
 Chromium Oxide, Green.—1s. 4d. per lb.
 Indiarubber Substitutes, White and Dark.—5½d. to 7½d. per lb.
 Lamp Black.—£48 per ton, barrels free.
 Lead Hyposulphite.—9d. per lb.
 Lithopone, 30%.—£22 10s. per ton.
 Mineral Rubber "Rubpron."—£16 to £18 per ton f.o.r. London.

Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£56 to £65 per ton.
Thiocarbamide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 6d. per lb. Dearer.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£43 to £45 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 11d. to 3s. 1d. per lb., according to quantity. Sales steady. Price firm.
Acid, Benzoic B.P.—2s. to 2s. 6d. per lb., according to quantity.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4½d. per lb., less 5% for ton lots. Raw materials dearer, equal to 4d. per lb. on finished product.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
Acid, Pyrogallol, Crystals.—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots according to quantity. Steady market.
Acid, Salicylic.—1s. 5d. to 1s. 6d. per lb., according to quantity. Steady market.
Acid, Tannic B.P.—2s. 9d. per lb. Quiet steady demand.
Acid, Tartaric.—1s. 1d. per lb., less 5%. Very firm. Demand good.
Amidol.—9s. per lb., d/d.
Acetanilide.—1s. 10d. to 2s. per lb. More inquiry.
Amidopyrin.—14s. per lb. Ample supplies.
Ammonium Benzoate.—3s. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—12s. 6d. per lb. Cheaper. Market less firm for Potash and Soda Salts.
Benzonaphthol.—4s. 3d. per lb. spot. Weaker. Demand quiet.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate } The price of Bismuth Metal has been raised
Bismuth Citrate } from 5s. to 7s. 6d. per lb. Bismuth Salts will
Bismuth Salicylate } be advanced accordingly.
Bismuth Subnitrate }
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 6d. per lb.; sodium, 1s. 7d. per lb.; ammonium, 1s. 11d. per lb. Market less firm for potash and soda salts.
Calcium Lactate.—1s. 7d. to 1s. 9d., according to quantity. Fair demand and steady market.
Chloral Hydrate.—3s. 10d. per lb., duty paid.
Chloroform.—2s. 6d. per lb. for cwt. lots.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£42 10s. per ton, in barrels ex wharf London.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—7s. 10d. to 8s. per lb.
Hexamine.—2s. 9d. to 2s. 10d. per lb. For bold crystal. Powder slightly less.
Homatropine Hydrobromide.—25s. to 30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon for makers' works, naked.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 11d. to 2s. 3d. per lb.
Magnesium Carbonate.—Light Commercial, £36 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £72 10s. per ton, less 2½% price reduced; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 46s. 6d. per lb.; March delivery. Synthetic 26s. to 35s. per lb. according to quality. English make. Increasing demand.
Mercurials.—Market very quiet. Mercury slightly easier. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
Methyl Salicylate.—1s. 9d. to 1s. 11d. per lb.
Methyl Sulphonol.—21s. 6d. per lb.
Metol.—1s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 2d. for B.P. quality. Keen competition has brought prices down.
Paraldehyde.—1s. 2d. to 1s. 6d. per lb., in free bottles and cases.
Phenacetin.—5s. per lb. in cwt. lots. Unsettled. Supplies exceed demand.
Phenazone.—6s. 3d. to 6s. 6d. per lb. Spot price lower than forward.
Phenolphthalein.—4s. 6d. to 5s. per lb. for cwt. lots.

Potassium Bitartrate 99/100% (Cream of Tartar).—86s. per cwt., less 2½% for ton lots. Raw material again dearer.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included. f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—4s. 9d. per lb. In fair quantities. Supplies exceed demand.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb. From natural benzoic acid. Supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
Sodium Salicylate. Powder, 2s. 2d. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 6d. per lb. Strong demand, market firmer.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1 cwt. kegs included.
Sulphonol.—14s. 6d. per lb. Little demand.
Thymol.—18s. per lb. Firmer.

Perfumery Chemicals

Acetophenone.—11s. per lb.
Aubepine.—12s. per lb. Cheaper.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 3d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—16s. 6d. per lb.
Coumarin.—17s. per lb.
Citronellol.—22s. per lb.
Citral.—10s. per lb.
Ethyl Cinnamate.—12s. 6d. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. 6d. per lb.
Geraniol (Palmarosa).—30s. per lb. Cheaper.
Geraniol.—12s. 6d. to 20s. per lb.
Heliotropine.—6s. 9d. per lb.
Iso Eugenol.—15s. 3d. per lb.
Linalol ex Bois de Rose.—25s. per lb.
Linalyl Acetate.—25s. per lb.
Methyl Anthranilate.—10s. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb.
Musk Ketone.—37s. 6d. per lb.
Musk Xylol.—11s. per lb.
Nerolin.—4s. 6d. per lb.
Phenyl Ethyl Acetate.—15s. 6d. per lb.
Phenyl Ethyl Alcohol.—14s. 3d. per lb.
Rhodinol.—37s. 6d. per lb. Cheaper.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 2d. per lb.
Vanillin.—25s. to 25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—13s. 9d. per lb.
Anise Oil.—2s. 6d. per lb.
Bergamot Oil.—16s. per lb.
Bourbon Geranium Oil.—24s. 6d. per lb. Advanced.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—11s. per lb.
Cinnamon Oil, Leaf.—6d. per oz.
Cassia Oil, 80/85%.—9s. per lb.
Citronella Oil.—Java, 85/90%, 5s. 9d. per lb. Ceylon, 3s. 2d. to 3s. 5d. per lb., according to quality.
Clove Oil.—7s. 9d. per lb.
Eucalyptus Oil, 70/75%.—2s. 1d. per lb.
Lavender Oil.—French 38/40% Esters, 35s. per lb.
Lemon Oil.—3s. 2d. per lb.
Lemongrass Oil.—5s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, March 5, 1925.

BUSINESS during the past week has been rather quieter, the few inquiries received being in nearly every instance for small quantities. Prices on the whole remain steady, with the notable exceptions of arsenic, formaldehyde, and acetone, which are all quoted at lower rates.

Industrial Chemicals

ACID ACETIC.—In moderate demand. 98/100% glacial quoted £56 to £67 per ton, according to quality and packing; 80% pure, about £42 to £44 per ton; 80% technical, £41 to £43 per ton, packed in casks delivered c.i.f. U.K. ports, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—In little demand and quoted price reduced to 5½d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 1s. 4½d. per lb., less 5%, ex store. On offer slightly cheaper for forward delivery.

ACID FORMIC, 85%.—Spot material unchanged at about £53 10s. per ton, ex store. Offered for early delivery from the continent at about £51 5s. per ton, c.i.f. U.K. port.

ACID HYDROCHLORIC.—In little demand, price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80%.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Continental offers remain unchanged at about 3½d. per lb., ex wharf. Spot material available at about 3½d. per lb., ex store.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Now quoted 11½d. per lb., less 5% ex store. Offered for prompt shipment at about the same figure.

ALUMINA SULPHATE, 17/18% IRON FREE.—Spot lots unchanged at about £7 5s. per ton, ex store. Offered for prompt shipment from the continent at about £6 12s. 6d. per ton, c.i.f. U.K. port.

ALUM.—Lump potash alum unchanged at £9 10s. per ton, ex store, spot delivery. Offered for prompt shipment from the continent at £8 2s. 6d. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand, unchanged at 2½d. to 3d. per lb. delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Grey galvanisers' crystals of English manufacture unchanged at about £30 per ton, ex station, packed in casks. Bags £1 per ton less. Offered from the continent at about £25 10s. per ton, c.i.f. U.K. port. Fine white crystals offered from the continent at about £21 per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Now on offer for early delivery at about £31 per ton, ex wharf. Spot lots quoted £33 10s. per ton, ex store. Continental material on offer at about £27 10s. per ton, c.i.f. U.K. port.

BARIUM CARBONATE, 98/100%.—Offered from the continent at about £7 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—English material unchanged at about £11 5s. to £11 10s. per ton, ex store. Offered from the continent at £9 10s. per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station; contracts, 20s. per ton less.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BORAX.—Unchanged. Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, ex station; continental easier at about £4 per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks, free.

COPPER SULPHATE.—British material quoted £24 10s. per ton, f.o.b. U.K. port. Continental available at about £24 per ton, ex store. Offered from the continent at about £23 to £24 per ton according to packages, c.i.f. U.K. port.

FORMALDEHYDE, 40%.—Spot lots now quoted £44 10s. per ton, ex store. Offered for prompt shipment from the continent at about £40 10s. per ton, c.i.f. U.K. ports.

GLAUBER SALTS.—White crystals of English manufacture unchanged at £4 per ton, ex store or station. Offered from the continent at about £3 7s. 6d. per ton, c.i.f. U.K. port.

LEAD, RED.—Imported material unchanged at about £44 per ton ex store, spot delivery.

LEAD, WHITE.—Quoted £46 10s. per ton, ex store.

LEAD, ACETATE.—Refined white crystals now offered at about £47 per ton, ex store, spot delivery. Quoted £46 per ton c.i.f. U.K. ports, prompt shipment from the continent. Dark brown quality on offer at £40 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Slightly cheaper quotations from the continent. Now quoted £4 per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Unchanged at about £29 per ton, ex wharf, prompt shipment from the continent. Spot material available at about £30 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Spot material quoted £25 5s. per ton, ex store. On offer from the continent at about £24 5s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Still higher quotations from the continent. Now quoted 3d. per lb., c.i.f. U.K. ports. A few spot lots available at about the same figure.

POTASSIUM NITRATE, SALTPETRE.—Refined granulated 99% on offer at about £25 per ton, c.i.f. U.K. port, prompt shipment from the continent. Spot material available at about £28 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Unchanged at about 8½d. per lb., ex store, spot delivery.

POTASSIUM PRUSSATE, YELLOW.—Unchanged at about 7½d. per lb., ex store, spot delivery. Offered for early delivery at slightly less, ex wharf.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 12s. 6d. per ton; broken 60%, £17 2s. 6d. per ton; powdered 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Little demand. Spot material now quoted £22 10s. per ton, ex store. Offered from the continent at about £20 per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £9 15s. per ton, ex station. Continental about £9 5s. per ton, ex store. Offered for forward delivery at about £8 5s. per ton, c.i.f. U.K. port. Pea crystals of English manufacture quoted £14 per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton, ex store; 96/98% refined quality 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Offered from the continent at about £24 15s. per ton, c.i.f. U.K. port.

SODIUM PRUSSATE, YELLOW.—In moderate demand and price unchanged at 4½d. per lb., ex store.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quote—60/62% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more. Crystals 31/34%, £9 5s. per ton, carriage paid U.K. stations. Minimum four ton lots with slight reduction for contracts over a period. Continental material slightly cheaper. 60/62% solid offered at about £11 per ton, c.i.f. U.K. port. Broken, £12 per ton, c.i.f. U.K. port. 30/32% crystals, £8 5s. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; Roll, £8 10s. per ton; Rock, £8 7s. 6d. per ton; Ground, £8 5s. per ton; ex store, prices nominal.

ZINC CHLORIDE, 96/98%.—Continental manufacture quoted £23 per ton, c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Spot material quoted £12 10s. per ton, ex store, in little demand.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

METATOLUYLENEDIAMINE.—Good home inquiries. Price 3s 6d. per lb.
 ALPHA NAPHTHOL.—Good home inquiries. Price 2s. 2d. per lb.
 DIMETHYLANILINE.—Good home and export inquiries. Price 2s. 2d. per lb., packages extra.
 TOLUIDINE.—Fair home inquiries. Price 1s. 4½d. per lb., packages extra.
 1.8.3.6. NAPHTHYLAMINE TRI SULPHONIC ACID (KOCH ACID).—Good home inquiries. Price 2s. per lb., 100%.
 BETA NAPHTHOL.—Good home inquiries. Price 11d. per lb.
 CLEVES ACID.—Good home inquiries. Price 3s. 1½d. per lb., 100%.
 NAPHTHONATE OF SODA.—Good home inquiries. Price 2s. 4d. per lb., 100%.
 PARAPHENYLENE DIAMINE H.CL.—Small home inquiries. Price 6s. 6d. per lb.
 A. NAPHTHYLAMINE.—Good home inquiries. Price 1s. 3d. per lb.
 METANILIC ACID.—Good export inquiries. Price 2s. 6d. per lb.
 METANITRANILINE.—Good export inquiries. Price 4s. per lb.
 BETA AMINO ANTHRAQUINONE.—Small export inquiries. Price 10s. per lb.
 PARANITRANILINE.—Good export inquiries. Price 2s. 2d. per lb.
 ANILINE OIL.—Good home and export inquiries. Price 7½d. per lb.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, March 5, 1925.

BUSINESS on the Manchester chemical market continues on comparatively quiet lines, with buyers confining their operations very largely to filling immediate or early needs. Until the chemical-consuming industries, particularly those of cotton and woollen textiles, get into regular stride the demand for heavy chemicals is bound to be very patchy. In the meantime, prices are not moving very much, either up or down, and few changes of interest since last week have to be reported.

Heavy Chemicals

Hyposulphite of soda is steady with demand on a moderate scale; photographic crystals are offering at £13 10s. to £13 15s. per ton and commercial quality at about £9 10s. Soda crystals are maintained at £5 5s. per ton. Prussiate of soda is in small request but values still hover round 4d. per lb. Glauber salts keep quiet at about £3 10s. per ton. Buying interest in saltcake is limited but there is little or no change in price, the current quotation being about £4 per ton. Bichromate of soda is steady and in moderate inquiry at 4d. per lb. Bleaching powder sells rather slowly at £9 10s. per ton. Both home and foreign demand for caustic soda keeps up to recent levels and values are firm, ranging from £15 12s. 6d. per ton for 60 per cent. strength to £18 for 76–77 per cent. Phosphate of soda is quiet but unchanged at about £13 per ton. Alkali keeps steady and in fair demand at £6 15s. per ton. Bicarbonate of soda is in moderate request at about £10 10s. per ton. Chlorate of soda is fairly steady at 2½d. per lb. but inquiry for this material is not too brisk. Sulphide of sodium is a dull section but there has been little alteration in prices; 60–65 per cent. concentrated solid is quoted at £13 15s. to £14 per ton and crystals at about £9 10s. Acetate of soda is attracting only a limited amount of attention at £20 to £21 per ton.

Caustic potash is rather quiet at the moment though values keep up; 90 per cent. material is currently quoted at £30 to £31 per ton. Carbonate of potash is firm and in moderate inquiry at £24 per ton. Prussiate of potash is on offer at 7½d. to 7¾d. per lb., but the demand is limited. Permanganate of potash keeps steady at 6¾d. to 8d. per lb. according to quality. Chlorate of potash is quiet but unchanged from last week at 2½d. per lb. Bichromate of potash is in quietly steady request at about 5d. per lb.

Arsenic still attracts little attention from buyers either for home use or for export; white powdered, Cornish makes, is quoted at about £34 per ton in Manchester. Sulphate of copper keeps steady but in limited demand at about £24 15s. per ton, f.o.b. Commercial Epsom salts are firm at £4 15s. per ton, with magnesium sulphate, B.P. quality, offering at £6 15s. Nitrate of lead is quiet but steady at round £41 10s. per ton. Acetate of lead is not selling particularly well, though values have not altered much; white is quoted at £46 10s. to £47 per ton and brown material at £43. Grey acetate of lime is maintained at £15 10s. per ton and brown at £10 10s. to £11.

Acids and Tar Products

There is not much movement in acetic acid though prices are fairly steady; 80 per cent. commercial quality is still offering at round £41 per ton and glacial at £67 to £68. Oxalic acid is very dull at 3½d. per lb. Tartaric acid is steady and in moderate request at 1s. 0½d. per lb. Citric acid is in quiet demand at about 1s. 4½d. per lb.

Among coal-tar products pitch continues quiet at 42s. 6d. per ton. Solvent naphtha is in small demand at 1s. 5½d. to 1s. 6d. per gallon. Creosote oil is maintained at 7d. per gallon. Naphthalene is in moderate inquiry at £15 to £15 10s. per ton for refined and £5 and upwards for crude. Carboic acid is weak at 5½d. per lb. for crystal and 8s. 8d. per gallon for crude.

Bismuth Salts Prices

MAY AND BAKER, LTD., announce an advance in the prices of bismuth salts in accordance with to-day's higher price for the metal. The quantity prices are as under and apply only for cash terms; smaller quantities would be charged extra:—

	Under 1 cwt. s. d.	Not less than 1 cwt. s. d.
Bismuth Carbonate	11 0	10 9 lb.
" Citrate	10 9	10 6 "
" Nitrate Cryst.	6 0	5 9 "
" Oxide	12 4	12 1 "
" Salicylate	9 6	9 3 "
" Subchloride }	11 0	10 9 "
" Subgallate	8 6	8 3 "
" Subnitrate	9 2	8 11 "

Quantities of 2 cwt. and upwards, for prompt delivery, or deliverable over three months, are subject to rebate of 3d. per lb. on completion.

Paint Bulletins

THE production of paints is now so complex and the range of products so extensive that the series of illustrated paint bulletins issued by the Technical Department of Thomas Howse, Ltd., of Union Works, Smethwick, Staffs, should prove of interest for practical reference on paint problems. A score of paint products are reviewed, each in a separate pamphlet, and such highly technical paints as rust-preventer dopes and graphite paints for steel, rust removers, steel priming paints and special long-wearing paints are dealt with individually.

The details and illustrations are very practically concerned with results of severe exposure tests. All dealing with the application of paints, more particularly in industrial processes, will realise the importance of "Derusta," a liquid which, while having no detrimental effect on sound paint or clean steel or iron, takes up the hydroxide in the rusted parts and forms an inert film which dries like a varnish, solid enough to permit the efficient application of an oil paint on top.

These booklets are as practical as they are enterprising and should do much to call attention to the necessity of the adoption of adequate paints to meet all particular conditions and circumstances. Only by this method can economical efficiency be assured.

Problems in Stereo Chemistry

At a meeting of the Belfast section of the Institute of Chemistry, on Thursday, February 26, Mr. C. R. Nodder, B.Sc., of the Linen Industry Research Association, gave a lecture on "Interesting Problems in Stereo Chemistry." He explained that certain chemicals when placed in the path of a ray of polarised light had the property of bending the ray through a definite angle. Much research work had been done with a view to discover the cause of this phenomenon. Van't Hoff showed that the carbon atom was able to attract to itself four other atoms, or groups of atoms. When these four groups were all different the chemical compound was without symmetry. It was compounds of this assymetric nature which had the property of bending rays of light. These compounds occurred largely in nature, menthol and camphor being familiar examples, but perhaps the commonest of all was ordinary sugar. Methods had been worked out for using this property of light to determine the amount of sugar present in a mixture. Many theories had been advanced to explain the reason for this property, and modern investigators were studying the effect of X-rays on various crystals.

Company News

UNITED TURKEY RED CO., LTD.—After providing for repairs, depreciation, etc., the profit for 1924 amounted to £189,145, and £24,421 was brought in, together making £213,566. The directors have set aside £31,000 for income-tax, and after payment of preference dividends amounting to £42,064, there remains £140,502. An interim ordinary dividend of 2½ per cent., tax free, absorbed £17,062, and the directors now recommend that £40,000 be placed to general reserve and that a final dividend at the rate of 7½ per cent., less tax, be paid on the ordinary shares, leaving £32,252 to be carried forward.

ELECTRO BLEACH AND BY-PRODUCTS, LTD.—The report of the directors for the year ended December 31 last states that the profit, after deducting repairs, standing charges, depreciation, etc., amounts to £48,490, to which must be added £3,291 brought forward from 1923, making a total of £51,781. The directors recommend a further dividend on the preference capital of 6½ per cent., making 10 per cent. for the year, and a dividend on the ordinary capital of 13 per cent., making 20 per cent. for the year. It is proposed to place £10,000 to the reserve account, leaving £1,781 to be carried forward. The annual meeting will be held at the Midland Hotel, Manchester, on March 10, at 1 p.m.

JOSEPH NATHAN AND CO.—For the year ended September 30 last the net profit amounted to £32,118, which compares with £11,486 for the preceding year. A sum of £28,213 was brought forward, the profit and loss account showing a total credit balance of £60,331. On January 1, 1924, a half-yearly dividend on the "A" preference shares was paid, and out of the balance of £42,831 the directors propose paying the half-year's dividend due on July 31 last on the "A" preference shares, warrants to be posted on March 21. They further propose to write off £1,500 from foreign investments (against nil) and £5,000 from new issue expenses (against nil), leaving a balance in the profit and loss account of £18,831. The half-yearly preference dividend due on January 1 last has still to be paid, while the dividend on the 8 per cent. cumulative participating preferred ordinary shares is in arrear as from September, 1922. The last dividend paid on the ordinary shares was 8 per cent. for 1921-22.

Tariff Changes

FRANCE.—Recent classifications include:—

Article.	How Classified for Duty.
Compositions or mordants for printing and dyeing fabrics, with a base of carbonate of soda and aniline salts and similar products	As Chemical products not specially mentioned (No. 0381)
Precipitated sulphate of lead obtained by an industrial process	Same duties as Artificial sulphate of lead (No. 0154)
Metallic cement formed of plaster or a similar mineral material and of oxide of iron	As Chemical products, not specially mentioned (No. 0381)
Cements for roofs, etc., with asbestos base without varnish solvent, for making roofs watertight	As Chemical products, not specially mentioned (No. 0381)

A Presidential Decree provides that crude and refined mineral oils and spirits, heavy oils and petroleum residues, originating in Trinidad, may provisionally be imported into France at the rates of the "Minimum" Tariff, increased by the "coefficients of increase" in force.

HAYTI.—A Law fixes the duty on sugar of up to 96 degs. of polarisation, imported into Hayti, at 16 cts. per kilog., and the duty on sugar of more than 96 and up to 98½ degs. of polarisation at 25½ cts. per kilog. These duties are to include all duties, surtaxes, and visa fees levied on importation, including a unified wharfage due of 3 gourdes per 1,000 kilogs., but excluding the dues on vessels. All sugar of more than 98½ degs. of polarisation is classed as refined sugar, the duties on which are not altered.

HUNGARY.—A Decree exempts, until further notice, the following articles from duty:—Fluosilicates of potash and soda, butyric, valeric, succinic and propionic acids.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICALS, ETC.—A wholesale merchant and commission agent at Eindhoven wishes to represent British manufacturers of chemical and electro-technical articles, caustic soda, solid and in lumps, and other heavy chemicals (excepting red lead, white lead, and litharge). Correspondence in English. (Reference No. 250.)

CHEMICAL MANURES.—The Egyptian Ministry of Agriculture is calling for tenders for the supply of chemical manures. (Reference No. B.X. 1606.)

TAR MACADAM AND CONCRETE.—The British Vice-Consul at Prague reports that a great deal of work will probably require to be done on the roads in the course of the next few years, and there would appear to be an opening for a British firm specialising in tar macadamisation and concrete road making to establish a branch. (Reference No. A.X. 1785.)

OILS, SOAPS.—A commission agent in Gothenburg desires to represent British exporters of industrial oils and soft soaps. (Reference No. 267.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks may be lodged up to April 4, 1925.

"APLATON."

454,059. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class 1. Johnson Brothers, Ltd., Cleveland Works, Wincolmlee Street, Sculcoates, Hull, manufacturers. November 28, 1924.

"VERTEX."

454,070. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Keeling and Walker, Ltd., Sutherland Mills, Sutherland Street, Stoke-on-Trent, Staffordshire, manufacturers. November 28, 1924.

"BITUDENSA."

455,065. For raw, or partly prepared vegetable, animal, and mineral substances used in manufactures, not included in other Classes. Class 4. Wailes Dove Bitumastic, Ltd., 5, St. Nicholas Buildings, Newcastle-on-Tyne, manufacturers. January 6, 1925. (To be Associated. Sect. 24.)

"VARNOLINE."

455,620. For raw, or partly prepared vegetable, animal, and mineral substances used in manufactures, not included in other Classes. Class 4. Anglo-America Oil Co., Ltd., 36, Queen Anne's Gate, Westminster, London, S.W.1, importers and dealers in petroleum oils. January 23, 1925. (To be Associated. Sect. 24.)

Sugar Problems

SUGARS from the organic chemist's standpoint were dealt with by Principal J. C. Irvine, F.R.S., at the Royal Institution on Friday, February 27. He reviewed the past research on sugar problems, and said that, in his opinion, there was still something to be known—a simpler molecule than glucose. That substance might, or might not, be formaldehyde. All was not known on the subject of the formation of the glucose molecules and the forces which held them. The lecturer said that we required new types of synthesis, and only when the chemist regarded it as a crime to conduct sugar reactions at boiling point would there be any real hope for sugar chemistry.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BOOTH, Mr. T. A., Tee-A-Bee Works, Idle, Bradford, manufacturing chemist. (C.C., 7/3/25.) £13 9s. 5d. January 28.

PALMER, Henry Deane (trading as DIRECT CHEMICAL AND ANILINE PRODUCE CO.), 403, Walworth Road. (C.C., 7/3/25.) £17 9s. 7d. October 31.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

CHADWICK (J.) AND CO., LTD., Manchester, dyers and bleachers. (M., 7/3/25.) Registered February 23, £40,000 2nd debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act 1908), present issue £11,000; general charge (subject to 1st debentures). *£11,037 9s. April 16, 1924.

HOLLIDAY (L. B.) AND CO., LTD., Huddersfield, chemical manufacturers. (M., 7/3/25.) Registered February 18, mortgage and charge to Bank; charged on properties at Deighton and Colne Bridge; also general charge. *Nil. April 19, 1924.

HYGIENIC PEROL CO., LTD., London, W., chemical manufacturers. (M., 7/3/25.) Registered February 20, £2,500 debentures, to A. G. Mason, 1, Darnley Road, Shepherds Bush, chemist; general charge. *Nil. July 1, 1924.

LEONARD'S MANUFACTURING CHEMISTS, LTD., London, N.W. (M., 7/3/25.) Registered February 21, £60 debentures; general charge. *Nil. December 31, 1924.

TAYLORS' DRUG CO., LTD., Leeds. (M., 7/3/25.) Registered February 18, £1,800 mortgage, to Miss F. N. Armitage, Hookholme, Park View Crescent, Roundhay; charged on 32 New Comen Street, Redcar; also registered February 19, £14,250 covenant to surrender and mortgage, to Leeds Permanent Building Society; charged on part of Hutchinsons Buildings, High Street East, Sunderland. *£111,744 os. 11d. September 12, 1924.

Satisfaction

CHADWICK (J.) AND CO., LTD., Manchester, dyers and bleachers. (M.S., 7/3/25.) Satisfactions registered February 23, £5,000, registered March 19, 1902; and £6,500, balance of amounts registered September 12, 1903, to January 12, 1910.

London Gazette, &c.

Company Winding Up

CHLOROPHYL AND CHEMICAL CORPORATION, LTD. (C.W.U., 7/3/25.) Winding-up order, February 24.

Bankruptcy Information

PAYNE, Edward Ernest Munro, "Red House," Narborough, in the county of Leicester, analytical chemist. (R.O., 7/3/25.) Receiving order, February 25. Creditor's petition.

New Companies Registered

GARNSWLLT ANTHRACITE COLLIERY CO., LTD., Queen's Buildings, Swansea. Colliery and quarry proprietors, manufacturers of patent fuel, gas coke, coal-tar, oil, and all by-products, etc. Nominal capital, £25,000 in £1 shares.

HYDROCOL, LTD., 27, Kirkgate, Newark. To acquire rights to work, exploit and deal in certain processes for the manufacture of glue and gelatine or any improvements relating thereto. Nominal capital, £20,000 in £1 shares.

LANCHESTER'S LABORATORIES, LTD.—To carry out research work, experiments and tests with the object of developing and applying to commercial uses any idea, discovery or invention, etc. Nominal capital, £24,000 in £1 shares. Solicitors: R. A. Rotherham and Co., Coventry.

MALAYAN WOOD DISTILLATION, LTD. Manufacturers of and dealers in chemical substances of all kinds and extractors of the same, whether by means of distillation or otherwise. Nominal capital, £75,000 in £1 shares (50,000 8 per cent. cumulative preference and 25,000 ordinary). Solicitors: Ashurst, Morris, Crisp and Co., 17, Throgmorton Avenue, London, E.C.

MOULDENSITE, LTD.—Manufacturers of Mouldensite phenol formaldehyde products, phenolic condensation products, plastic compositions for use in coating surfaces or other purposes, plastic phenol condensation products and rubber composition, etc. Nominal capital, £6,000 in £1 shares. Solicitors: Orford and Sons, 87, Fountain Street, Manchester.

NORWOOD WHARF CHEMICAL CO., LTD., Norwood Wharf, Southall. Manufacturing chemists and druggists, drysalts, etc., etc. Nominal capital, £8,000 in 7,500 preference shares of £1 and 2,000 ordinary shares of 5s.

G. RUTH, LTD., 21, Harrington Street, Liverpool, manufacturers and dealers, in colours, paints, pigments, oils, chemicals, turpentine, varnish, glue, etc. Nominal capital, £5,000 in £1 shares.

SCOTTISH ROAD MATERIALS, LTD., 2, Gresham Buildings, Basinghall Street, London, E.C.2. To acquire work and develop in Scotland a licence or grant for the manufacture of Amoa Coldpalte and other preparations connected therewith. Nominal capital, £6,000 in 5,000 7½ per cent. non-cumulative preference shares of £1 and 20,000 ordinary shares of 1s.

Chemical Manufacturers' Voluntary Liquidation

IN pursuance of the provisions of the Companies (Consolidation) Act, a meeting of the creditors of Richard Naylor, Ltd., manufacturers of colours and chemicals, 35, Brown Street, Manchester, was held on Wednesday, February 25, at Manchester, when the chair was occupied by Mr. R. Naylor.

The liquidator reported that, after allowing for the preferential claims, the statement showed a deficiency of £772 os. 2d., or an approximate dividend of 3s. in the £. Mr. Wood added that according to the deficiency account the excess of assets over liabilities on January 1, 1923, was £81 os. 3d. The large sum of £1,415 had been lost by bad debts.

No resolutions were passed, and the voluntary liquidation of the Company will therefore be continued with Mr. Wood as liquidator.

The Brunler Boiler

WITH reference to the article on the Brunler boiler, which appeared in THE CHEMICAL AGE of February 21, we are informed that Mr. Brunler has made Featherstone Hammond Partners, Ltd., of 28, Victoria Street, Westminster, responsible for all negotiations connected with this invention, and has entrusted them with all arrangements for the manufacture, supply, and installation of plant. All inquiries, therefore, should be referred to them.

